

TROPICAL DISEASES
BULLETIN

Vol. 36]

1939



[For some time it has been considered by the staff of the Bureau that a useful addition to the abstracts in the *Tropical Diseases Bulletin* would be a series of summaries collating the information contained in the abstracts. This suggestion has received support from officers of the Colonial Medical Service abroad and it has therefore been decided to publish each month from January 1939 onwards a summary of the abstracts on a particular subject which have appeared in the volume of the *Tropical Diseases Bulletin* for the preceding year. The first of these is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1938 Vol. 35. Summaries have been compiled below. The information from which the References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.]

SUMMARY OF RECENT ABSTRACTS
I CHOLERA.*Epidemiology*

PARTHASARATHY and SUBBARAJAN (p. 303) find on analysis according to the periodogram method, that in the Southern Indian State of Mysore cholera occurs in a periodicity of six years. TURNBULL (p. 738) states that epidemics in South China appear in the hot rainy months and occur about every five years. The Eastern Bureau of the League of Nations Health Organisation (p. 735) notes that epidemics are associated with high relative humidity, high temperature and intermittent rain and that cholera spreads along the highways of human traffic and that man is himself the chief agent of spread. RAYAT and LIEOL (p. 738) attribute an explosive outbreak in Shanghai to the incursion of war refugees. MALIU and PALUD (p. 738) ascribe the disappearance of this epidemic to two factors: one climatic, the passing of the hot weather and the other prophylactic, rapid segregation and vaccination.

The possibility of the spread of cholera by pollution of sea water and food materials has been investigated. The Eastern Bureau of the League of Nations Health Organisation (p. 735) reports that in Japan the vibrio is said to be capable of surviving in sea water for 47 days and that fish and shell fish may become infected and pass on the infection to persons consuming them. GENEVEY and BRUNEAU (p. 739)

[using both pure sodium chloride and crude sea salt which gave approximately equal results] (p. 742) record the following experimental results (1) the vibrio cannot grow if the concentration of salt exceeds 8 per cent. (2) It remains alive in concentrations of 9 to 11 per cent. for 24-48 hours, in 8 per cent. for two weeks or more in 5 to 7 per cent. for three weeks or more and in 2.5 per cent. for four weeks or more. [The total salinity of ocean water is from about 3.3 to 3.7 per cent.]

The same authors (p. 742) found that the degree of salinity of certain foodstuffs determined the length of life of cholera vibrios incorporated in them. Soya milk and soya cheese are consumed on the day of preparation and as the vibrios can live in them for 12 hours they may be dangerous in epidemic periods.

Aetiology

For the identification of vibrios causally related to epidemic cholera GARDNER and WHITE (p. 306) emphasize the reliability of serum containing specific O (somatic) but not "H" (flagellar) agglutinins. All specific vibrios give the type 1 Heiberg reaction (fermenting mannose and saccharose but not arabinose) which however is not peculiar to these vibrios and they fail to haemolyse goat erythrocytes. To these TAYLOR (p. 305) adds that the true cholera vibrios give positive cholera red and negative Voges Proskauer reactions. El Tor vibrios gave positive Voges Proskauer reactions in 5 of 6 strains. "There have not been isolated vibrios of any other serological type than the classical *V. cholerae* from any series of clinical cases of cholera which have been chronologically or geographically connected. DE VOGEL (p. 734) however reported an important outbreak of clinical cholera in the Celebes Islands in which from 47 patients with typical symptoms a vibrio of the El Tor type was isolated.

POPESCU-COMBESCU and WISNER (p. 307) find it impossible to lay down absolute characters in the morphology of *V. cholerae*. Indole formation is common to various vibrios but if a vibrio fails to haemolyse a suspension of goat erythrocytes and is agglutinated by specific serum it may be certainly taken to be a true cholera vibrio. Sugar fermentation according to Heiberg's group 1 is a characteristic of true cholera vibrios.

VENKATRAMAN and PANDIT (p. 739) record a severe epidemic of cholera in South India caused by the Ogawa type of vibrio. This does not support Japanese work which associates that type with sporadic or mild cases.

MARRAS (p. 309) distinguishes the El Tor vibrio by its haemolytic character and by the fact that it does not produce the symptoms of cholera and does not possess the epidemiological characters of the cholera vibrio. The Cholera Commission of the Office International d'Hygiène Publique (p. 734) agrees that the designation El Tor should be restricted to strains which give agglutination with O Group No. 1 cholera serum and that they may have Inaba or Ogawa antigenic structure.

RAJA (p. 303) states with reference to the spontaneous variability of cholera vibrios that vibrios isolated from secondary cases do not always correspond serologically with those from primary cases, though the source of infection must have been the primary cases [see below *Research*].

GENEVRAY and BRUNEAU (p. 741) give a detailed account of the characters which appear to have been uniform, of 500 strains studied

in the epidemic of Tonking Details will be found in the original abstract

LEFEBVRE and GALLUT (p 740) describe a selective medium modified from that of Vedder and van Dam for the isolation of *V cholerae* Colonies appear in 10 to 12 hours For details of the preparation of the medium the original abstract should be consulted ABE (p 310) describes a fluid medium containing a decoction of mulberry leaves in which cholera and cholera like vibrios grow with the production of acid unlike the dysentery and salmonella groups of bacilli The difference is explained by the fact that the leaves contain saccharose which is fermented by the vibrios but not by the dysentery and salmonella group WHITE (p 306) makes the point that in the case of original isolation cultures the presence of cholera phage may possibly be capable of reducing the numbers of *V cholerae* in relation to insensitive secondary invading vibrios

The Medical Research Institute of Shillong (p. 740) reports that in certain undoubted cases of clinical cholera it seemed impossible to find agglutinable vibrios and that the presence or absence of phage infecting the vibrio in nature did not appear to influence their agglutinability

PANG (p 743) describes an organism with a single polar flagellum isolated by blood culture from a debilitated patient This was antigenically related to *V cholerae* Vibrios inagglutinable by cholera sera and divisible into two groups, were isolated from cases of enteritis by HISANO (p 743) LIEOU (p 743) reports the isolation of a cholera vibrio from the heart blood of a gumeapig infected by means of the gastric contents of a patient with *cholera sicca*

Clinical

DOORENBOS (p 741) remarks that only one of the properties of the cholera vibrio remains uncontested that it is a Gram negative vibrio Clinically cholera may vary from simple diarrhoea to the typical highly fatal type There are two main types the epidemic and the endemic but there still remains only one cholera vibrio in the more or less complete state or showing dissociation in its properties

The Cholera Commission of the Office International d'Hygiène Publique (p 734) considers that in spite of the improvement in bacteriological diagnosis the practical criterion of cholera still remains the clinical one and that this should form the basis for administrative and prophylactic action

Treatment

TURNBULL (p 739) describes a routine treatment which consisted in—administering first intravenously sod. bicarb 160 grs. sod. chloride 60 grs. water 1 pint in order to counteract acidosis This was followed by intravenous hypertonic salt solution—sod. chloride 120 grs. calc chloride 4 grs. pot chloride 6 grs. water 1 pint Four pints of this solution at 104°F may be given in an hour and it may be repeated 2 or 3 times a day During the flow of the fluid the pulse and blood pressure are watched and the administration is stopped when blood pressure comes back to normal and the pulse becomes full and bounding The state of the pulse is the index for repetition of

treatment and 1/50 grain atropine is given twice daily to prevent pulmonary oedema. Cases treated in hospital amounted to 400 to 500 and the deaths to 35 to 40

LAMB (p 745) quotes a standard treatment consisting of intravenous salt solution and the administration by the mouth of kaolin 1½ lb in a quart of water the dose being one ounce every 15 minutes. NAAME (p 745) on the basis of the similarity between the symptoms of cholera and those of hypoadrenalism and the possibility that the former may be due to selective action of the cholera toxin on the suprarenal glands has instituted a treatment by adrenalin which he administers in subcutaneous doses of 4 to 6 mgm every 24 hours for some days combined with injections of artificial serum if there is much dehydration

LE ROUZIC (p 304) obtained data which appeared to show that patients receiving all types of treatment simultaneously—Raymond's hypertonic serum camphorated oil adrenalin and bacteriophage—had the greatest chance of recovery. Mortality among treated cases was 43·6 per cent. (But the average of a large number of recorded outbreaks is about 50 per cent.) TAYLOR (p 306) reports that results obtained in Calcutta show no appreciable difference in the death rate of cases treated by bacteriophage and the control series but that a certain value attaches to bacteriophage treatment added to ordinary methods when only the figures for cases in which agglutinable vibrios were isolated are taken into account

Control

Preventive measures on the occurrence of suspected cases of cholera should not await the isolation of a typical O agglutinable vibrio. This is the opinion expressed by the Cholera Commission of the Office International d'Hygiène Publique (p 734). The writer of the article in the *Washington Public Health Reports* (p 304) states that "Because protected water supplies and protective milk supplies are the rule instead of the exception in American cities to-day cholera is no longer the menace to this country that it was during the last century" (italics not in the original)

HEGGS (p 735) writing of Iraq states that among the most important means of prevention are the supply of advance information from other countries of the existence of cholera and the compulsory inoculation imposed on Haj pilgrims. Inoculation of cholera vaccine is the mainstay of preventive measures. It is intended also to use cholera phage. Police control of population movement is attempted, but cannot deal with the problem of carriers. Stress is laid on the correct recognition of the first cases, and the diagnosis is primarily based on clinical and epidemiological grounds.

TAYLOR (p 306) details the essentials for strains from which vaccine should be prepared. Strains should (1) be smooth and translucent (2) form stable suspensions in normal salt solution (3) have the serological characters of group O No 1 GARDNER and VENKATRAMAN subtype Inaba and agglutinate to a significant titre with serum prepared from the designated Inaba O antigen provided by the standards laboratory of Oxford (4) ferment mannose and saccharose but not arabinose (5) not be haemolytic (6) be isolated from cases of cholera during an epidemic (7) be highly stable even in subculture

MILLAR and MOHI UD-DIN (p 303) found the percentage incidence of cholera in three statistically comparable categories of persons in Kashmir to be as follows —

- (1) Inoculated with 0.5 cc vaccine incidence 0.49 per cent
- (2) Inoculated with 1 cc vaccine incidence 0.29 per cent
- (3) Not inoculated incidence 11.35 per cent

Vaccination with 1 cc is therefore recommended

Research

MACNEAL, FRISBEE and KRUMHOLZ (p 310) point out differences between the lysis of vibrios by cholera immune serum and that brought about by bacteriophage. Phage lysis can be transmitted in series and there are differences in the sizes of the vibrios under the two conditions. Intracellular granules which may possibly possess the power of reproduction and of the secretion of lytic enzymes are found in the vibrios altered by bacteriophage but not in those altered by serum.

The investigation of the phenomenon of bacterial variation with regard to *V. cholerae* has been conducted by means of single cell culture. LINTON SEAL and MITRA (p 742) succeeded by this method in obtaining a new strain with different biochemical cultural and serological characteristics and a different chemical structure from those which characterized the culture from which the original single cell was taken. The new strain was still however within the protein and polysaccharide framework of the original and the capacity for transformation was therefore limited. WHITE (p 743) shows that either R or S cholera vibrios may produce rugose colonies. The rugose habit of growth is due to the property of zoogaea or capsule formation by abnormally active secretion of mucinous material. Rugose colonies perpetually revert to their normal S or R habit of proliferation. LINTON (p 209) on the basis of single cell experiments similar to those mentioned above finds that the association of metabolic activity with chemical groups appears to be reasonably constant and that it changes in parallel with any change of chemical structure in the course of variation. If these changes occur also in the field they may provide an answer to the question as to whether cholera cases arise only from previous cases and contacts or whether chronic carriers of groups A and V can on occasion start epidemics.

TAYLOR (p 305) finds that no vibrio agglutinable or non-agglutinable made rough by treatment with antiserum has shown any change in its biochemical reactions.

VASSILIADIS (p 737) finds that extraction by chloroform or ether appears to accentuate the flagellar H agglutination of the cholera vibrio and to cause an H agglutination by anticholera sera to appear in inagglutinable vibrios. He also finds that the haemolysins sometimes produced by the cholera vibrio either spontaneously or under the influence of the anticholera bacteriophage although they are of the same nature as those of the El Tor vibrio are much more feeble in their action. The position with regard to the nature of the El Tor vibrio is still far from clear.

BERNARD GUILLERM and GALLUT (pp 308-309) obtained a haemodigestive ferment from nutrient bouillon after 8 days of culture of cholera vibrio which on certain denatured proteins exerts a tryptic

cannot be obtained in vitro DEYNE (p. 13) has studied the effects of undecane diamidine. Lethal doses cause liver and kidney damage with hyperglycaemia and nitrogen retention. The upper limits of dosage are discussed.

Senior WHITE (p. 14) confirms his previous work in the Jeppore Hills which showed that *A. culicifacies* though prevalent is of no pathogenic importance. Control limited to the *functus* group has not resulted in deterioration of health and has effected considerable saving in larvicides. The three transmitting species are 4 *floridulus* 1 *normana* and 4 *mirimus*. Similar results (p. 14) were found in the Singhbhum Hills in an intensely malarious country in which transmission occurred in all months except May, June and July.

SIVTOR and SHUTE (p. 15) show that under favourable conditions of environment 4 *maculipennis* infected with *P. vivax* show no higher mortality than uninfected mosquitoes. There is however some evidence that under favourable conditions infections with *Plasmodium* tend to shorten life but these conditions are not those which usually apply in nature. Death from infection with *Plasmodium* is therefore not responsible for the fact that certain species are not natural transmitters.

C IV

PERAGALLO (p. 15) describes a mosquito trap

DE JESUS (P. I.) JAO (S. G.) & GARCIA (E. J.) Malaria Survey of Calanan, Laguna.—*Jl Philippine Islands Med Assoc* 1938. May Vol 18 No 5 pp 291-310 14 refs

Calanan is a small agricultural community 77 kilometres south of Manila with a population of 3038. Though only a few metres above sea level it is situated at the foot of a mountain range. There is an extensive network of small fresh water streams which serve as breeding places for 4 *mirimus* var *flavivestris* the most important vector of malaria in the Philippines. Malaria is more prevalent in the outlying parts of the town than in the central part. *P. vivax* is most in evidence in March the spleen index of primary school-children was 13.8 in August. Very few mosquito dissections were made none was found infected.

Norman White

STRICKLAND (C.) Holland and Bengal. Reclamation and Malaria in the Two Countries.—*Trans Roy Soc Trop Med & Hyg* 1938. Aug 23 Vol 32 No 2 pp 277-288 With 13 figs (8 on 1 plate)

HODGKIN (E. P.) Naturalistic Methods of Malaria Control.—*Jl. Malaya Branch Brit Med Assoc* 1938 June Vol 2 No 1 pp 24-29

HUTY (Clay G.) The Significance of Different Strains of Malaria and Mosquitoes in the Epidemiology of the Disease.—Reprinted from *Amer Jl Med Technology* 1938. Mar Vol 4 No 2 6 pp. [10 refs]

This paper contains several interesting speculations. The life-cycle of malaria involves three kinds of animals, parasite mosquito and man, all of which are bisexual and so subject to greater chance of variation than are unisexual organisms. It seems reasonable to assume that all three are undergoing genetic change. The author has shown that with avian malaria, susceptibility to the parasite is an inherent

characteristic of the individual mosquito this susceptibility being transmitted in a simple Mendelian fashion. If such should be the case with malaria and Anopheline mosquitoes it might be possible for a mosquito population to change from a low to a high degree of susceptibility or vice versa. This might well happen in temperate climates where only few individual mosquitoes survive the winter. With regard to strains of malaria parasites that differ only immunologically it would be consistent with general knowledge of heredity to consider such differences as genetic. V II

AFRIDI (M. K.) ABDUL MAJID (S.) & JASWANT SINGH. Malaria In Kutch State.—*Jl Malaria Inst of India* (formerly *Records of the Malaria Survey of India*) 1938. June Vol. I No. 2. pp 187-213. With 3 maps.

The observations recorded in this paper were made during ten days in January and six weeks in September-October 1937 and were prompted by an increased prevalence of malaria during the closing months of 1936. Kutch is a small State of 4,342 square miles. It is almost an island being joined to or separated from the coast of Sind by an extensive salt marsh. It has an equable climate and a low rainfall (average 12.6 inches). Bhuj is the capital population 21,858 and Mandvi on the south coast is the chief port population 25,342. The spleen rates of these two towns of children from 2 to 10 years of age were 10.5 and 2.3 per cent respectively. The highest spleen rate found was 45.1 in Vijaya Vilas Palace in 51 children examined. The most prevalent anophelines were *subpictus culicifacies stephensi* and *annularis*. specimens of *turkudis fluvialis* and *barb rostris* were also found. 4 *stephensi* was the only species found infected. Recommendations regarding measures for the control of malaria are contained in the report. A II

MITRA (H.). Increase of Malaria In Manbhum, 1938. (Abstract.—*Jl Malaria Inst of India* (formerly *Records of the Malaria Survey of India*) 1938. June Vol. I No. 2. pp 215-216.

The increased prevalence of malaria reported in the Manbhum District of Bihar was not reflected in any increased mortality ascribed to "fevers" or in increased mortality from all causes. During a brief survey here reported malaria was found to be excessively prevalent in villages near the foot-hills. The two highest spleen rates recorded 85 and 41 were in villages so situated. The anophelines found during the survey were *culicifacies annularis pallidus vagus fluvialis* and *jeyporiensis*. A W

DE MELLO (L. Froilano). La campagne anti-malarienne dans les régions rurales de l'Inde portugaise. [Anti-Malaria Measures in Rural Areas of Portuguese India.]—*Rev de Malariologia Sez. I.* 1938. Vol. 17 No. 3. pp 208-224.

Portuguese India comprises three districts. Goa 3,806 square kilometres population 505,000. Damaun 450 square kilometres pop 58,000 and Diu 37 square kilometres pop 17,000. In the part of Goa known as the Velhas Conquistas (with the exception of Old Goa) and in certain villages of the Novas Conquistas malaria is very little prevalent the spleen index being very low. On the other hand

repeated every five days in the rare cases in which crescents persist is sufficient to devitalize gametocytes. Children under one year of age do not tolerate atebryn. Λ II

BARBOSA (Amando) Estudios sobre el poder antirrecidivante de los medicamentos antipalúdicos [Study of the Value of Anti-Malarial Remedies for the Prevention of Relapses].—*Rev. de Malaria* Sez I 1938 Vol 17 No 3 pp 165-183 With 3 graphs

This paper records the results of treatment of 175 persons with primary infections and of 139 persons with reinfections of *P. vivax*. The treatments used comprised quinine alone in varying doses and for varying periods of time quinine and plasmoquine and atebryn and plasmoquine. The author concludes that in Spain the treatment of initial attacks of primary *vivax* infections and of *vivax* reinfections should not be prolonged more than seven or eight days. Atebryn associated with plasmoquine is much more effective than quinine or atebryn alone or the association of these two drugs in the prevention of relapses. Unusual symptoms ascribed to the administration of atebryn were conjunctivitis (two cases) and laryngitis (one case). Atebryn for five days followed by plasmoquine for four days also gave excellent results in *falciparum* infections. Relapses of *falciparum* infections were more frequent among children below four years of age than in later age groups. Λ II

PAKEMHAM WALSH (R.) & RENNIE (A. T.) Sulphonamides in Malaria. —*Lancet* 1938 July 9 p. 79 With 1 chart.

This short note concerns a patient suffering from general paralysis who was inoculated with *P. vivax*. Subsequently he was found to be suffering from cystitis which was treated with sulphonamide preparations. This treatment appeared to cause the elimination of parasites from the peripheral blood and the cessation of rigors. Seven weeks after the eighth rigor there was a relapse of malaria which was treated with quinine. Λ II

PIZZILLO (Giuseppe) Sulla cura di Maurizio Ascoli nelle infezioni malariche. Nota \ Studio delle infezioni primitive [Ascoli's Method of Treatment in Primary Infections].—*Rev. di Malaria* Sez I 1938 Vol 17 No. 3 pp. 184-207 With 16 graphs. [71 refs.] German summary (7 lines)

This is a description of sixteen cases of malaria treated by Ascoli's method. All were recently acquired primary infections. In nine of these cases treatment was begun during the acute febrile stage of the disease. In others the beginning of the treatment was followed, after a short interval by a return of one or more febrile attacks, the number varying inversely with the duration of the period elapsed between the onset of the primary attack and the commencement of the adrenalin therapy. Very small doses of quinine in conjunction with adrenalin treatment are sufficient to control the fever. Splenic enlargement does not occur in cases so treated. Spleens already enlarged are reduced in size. The general condition of the patient suffers but little from the infection. Febrile attacks cease altogether on the termination of the treatment or very soon after. Λ II

KRITCHEVSKI (I L.) Le phénomène de renforcement en chimiothérapie Renforcement de l'action thérapeutique des composés antimalariques de la série quinoléique [The Phenomenon of Increased Effect in Chemotherapy Increased Therapeutic Effect with Antimalarial Compounds of the Quinoline Series.]—*Ann Inst Pasteur* 1938. Aug Vol 61 No 2 pp 205-216 With 6 diagrams

The unimportance of the reticulo-endothelial system (R.E.S.) in the chemotherapy of malaria is pointed out by the author. When the system is blocked in certain birds by trypan blue the action of anti-malarial drugs is appreciably affected especially if used early in the infection. The integrity of function of the R.E.S. is necessary for intrinsic action by antimalarial drugs as well as for increased effect of such drugs by other compounds which themselves have no antimalarial properties.

The phenomenon of increased effect has been noted when using quinoline compounds along with trypan blue or pyrrrole blue in *P. praecox* infections against which neither of the latter two compounds has any action. Thus plasmocide (6-methoxy-8-diethylamino-propylamino quinoline) administered in inactive doses in *P. praecox* infections of canaries along with either of the above two compounds by injection or by mouth exerts a therapeutic effect. Pyrrrole blue when given early in treatment with maximum doses of plasmocide delayed infection for 13 days as opposed to a delay of 2 days brought about by similar doses of plasmocide given alone. The optimal dose of pyrrrole blue lies between 0.0002 gm. and 0.005 gm. for a bird of 20 gm weight. The optimal result on the infection is obtained where plasmocide is given on the third day after inoculation of the canary with *P. praecox* and is accompanied by pyrrrole blue on the first two days. The components of pyrrrole blue alone or together cannot bring about the increased action. An inactive quinoline compound was found to exert a therapeutic effect when accompanied by pyrrrole blue but the latter has no effect in presence of quinine or atabrin. Both trypan and pyrrrole blue are deposited in the R.E.S. where it is thought they react with plasmocide to give a new compound; there is no reaction between them however *in vitro*. The effect of either of these two compounds is not brought about by sensitization of the organism to them since five generations of parasites treated with pyrrrole blue behaved to an inactive dose of plasmocide like fresh parasites. The same phenomenon of increased action has been described also in human malaria.

J. D. Fulton

DEVINE (J.) Studies in Chemotherapy XVIII. Changes in the Blood and Urine produced by Administration of Undecane Diamidine.—*Ann Trop Med & Parasit* 1938 Aug 2. Vol 32 No 2. pp 163-175 [15 refs.]

A study has been made of the upper limit of dosage of undecane diamidine which may be given without serious renal or hepatic injury. Analyses were made on fasting blood samples on two successive days and on urines collected on the same days following intravenous injection of 5 mgm. of the drug per kilo into rabbits. There is no significant change in blood sugar but blood urea values increased and were again normal in two days while N.P.N. changes were smaller.

in amount but with a similar trend. Anorexia and nausea caused by the drug with consequent variation of food intake makes the interpretation of the nitrogen balance difficult. The experiments were repeated with animals on half rations to simulate the conditions in anorexia and nausea. The results were the same as above albuminuria was absent and qualitative tests of renal or hepatic injury were negative.

Similar analyses on animals receiving successive small doses showed no significant changes. When maximum doses were given there was a transient hyperglycaemia with nitrogen retention. On histological examination the convoluted tubules of the kidneys showed degenerative changes. Lethal doses caused liver damage with hypoglycaemia and rise in amino nitrogen. Histological examination confirmed the liver damage and likewise that of kidneys. In neuro-syphilitic patients there were no significant changes in blood or urine. Blood urea values increased with a large dose—albuminuria and glycosuria being absent. In man the blood sugar level is not affected by the maximum tolerated dose but danger to the kidneys is indicated. The toxic action of undecane diamine on liver and kidneys broadly resembles that due to synthalin and other alkylene diguanidines.

J D Fulton

WHITE (R. SENIOR). On Malaria Transmission in the Jeypore Hills. Part II. A Second Year's Results.—*Jl. Malaria Inst. of India* (formerly *Records of the Malaria Survey of India*) 1938. June. Vol. 1 No. 2. pp 129-145 [10 refs.]

Part I of this paper (see this Bulletin 1937 Vol. 34 p. 627) reported that *Anopheles* of the *funestus* group *flavistilis* varus and minus were responsible for malaria transmission in the Jeypore Hills, and that *A. culicifacies* which is very prevalent is of no pathogenic importance. A second year's work has fully confirmed these findings. *Anopheles* control limited to the *funestus* group has not resulted in any deterioration of health of the imported railway staff. It has, however, effected a 78 per cent saving in expenditure on larvicides. Catches of adult females in dwelling houses were repeated throughout a year. Of the total caught *A. culicifacies* contributed 60.2, 4.1 and 35.7 per cent. respectively in cattle sheds. Pig-sties offer no attraction as a resting place to any of the twenty three species of anophelines found locally. The second year's dissections gave oöcyt and sporozoite rates as follows: *culicifacies* 0.08 and 0; *flavistilis* 6.8 and 3; *varus* 8.9 and 4; and *minus* 5.1 and 4.1. Oöcyt counts are given for the three transmitting species. The counts were low: three-quarters of them had less than six oöcyts per stomach. There is a paucity of crescents in blood films in the Jeypore Hills. Observations with a human bait trap-net led to the conclusion that each inhabitant of the village in question would receive four infected bites in September—seventeen in October and fifteen in November.

WHITE (R. SENIOR) & DAS (B. K.). On Malaria Transmission in the Singhbhum Hills.—*Jl. Malaria Inst. of India* (formerly *Records of the Malaria Survey of India*) 1938. June. Vol. 1 No. 2. pp. 160-184. With 1 fig.

The Singhbhum Hills separated from the Bay of Bengal by the Orissa Plain comprise the British Indian District of the same name.

and three Indian Feudatory States. The higher hills exceed 3 000 feet. The hills contain the chief iron ore deposits of India. The district is intensely malarious. It was formerly believed that *A. culicifacies* which is very prevalent was a vector of importance. The observations recorded in this paper indicate that as in the Jeypore Hills anophelines of the *funestus* group *fluvialis* *varuna* and *minimus* are much the most important vectors the only ones that require control to afford malaria protection. Of 1 611 *A. culicifacies* dissected the oöcyst rate was 0.3 and the sporozoite rate zero. Of 1 031 *A. fluvialis* these rates were 4.6 and 1.8. Of 189 *A. varuna* 4.2 and 1.1 and of 334 *A. minimus* 6.9 and 3.9. Transmission of malaria was found to occur throughout the year except in May, June and July. A. W.

SINTON (J. A.) & SHUTE (P. G.) A Report on the Longevity of Mosquitoes in Relation to the Transmission of Malaria in Nature.—*Ministry of Health Reports on Public Health & Med. Subjects No. 85* pp. iv+45. With 2 charts. [69 refs.] 1933. London. H.M.S.O. [9d.]

It is evident that the length of life of an adult *Anopheles* may affect its power of transmitting malaria. An insect may normally live so short a time at least under certain climatic conditions as to prevent the *Plasmodium* developing to the sporozoite stage in it. The authors review our present knowledge of longevity and contribute their own material.

The insect's length of life is influenced by a great variety of factors. Some are internal, such as the nutrition of the larva (not discussed here) the rate of metabolism of the adult and its preparation for egg-laying or hibernation. There are many external factors also of which we believe that temperature and humidity are the most important. Our knowledge of these subjects is at present fragmentary and much of the earlier work was carried out under difficult conditions and cannot be regarded as satisfactory. The authors summarize these subjects but it is not easy to present a concise résumé of them. Till much more is known about metabolism and the effects of climate it will hardly be possible to consider the natural span of life i.e. the normal length of life under favourable conditions.

In discussing the possible effect of *Plasmodium* on the length of life of *Anopheles* the authors point out that it does not produce gross lesions in the tissues. The parasite seems to provoke no histological reaction except that when salivary glands are heavily infected they become altered in shape and very friable. There is a considerable body of opinion that even a heavy infection does not reduce the insect's length of life (but apparently no previous author has devised experiments in order to investigate this point). The authors' very great experience mainly based on *A. maculipennis* supports the view that the parasite is harmless to the mosquito. They have also performed a number of controlled experiments which are set out in full. Of these one may be quoted. A number of *A. maculipennis atroparvus* were collected in nature in November a season when the insects are not using food to develop ovaries. They were divided into two groups one of which was fed on a clean man, the other on a carrier of *P. vivax*. Both groups were then kept at 75°F (24°C) and a high humidity having daily an opportunity of feeding on a rabbit. No differences were observed in the mortality either in the first 8 days the period during

which the ookinets penetrate the gut wall or later. There is reason for thinking that all or nearly all the mosquitoes which had fed on the infected man had acquired the infection. Such experiments as these show clearly that neither *P. vivax* nor *falciparum* shortens the life of *atroparvus*. This is shown by experiments under various conditions of maintenance all of which might be described as "favourable." But there is some evidence that under "unfavourable" conditions for instance partial starvation infection with *Plasmodium* tends to shorten life. The authors refer to certain carefully controlled experiments with *Culex fatigans* and *Protoplasma* in which a significantly higher mortality was observed among infected mosquitoes (see this Bulletin 1938 Vol 33 p 278) in these experiments the conditions were unfavourable and the view is put forward that the results are not applicable to what occurs in nature.

In general the authors hold that death from infection with *Plasmodium* is not mainly responsible for the fact that certain species of *Anopheles* seldom transmit malaria in nature.

P. A. Buxton

PERAGALLO (Italo) Un catturatore trasparente delle zanzare. (A Transparent Trap for Mosquitoes.)—*Riv di Malariologia* Sez. I 1938 Vol. 17 No. 3. pp. 231-234. With 1 fig. French summary (4 lines)

The author figures and describes a small piece of apparatus for the capture of mosquitoes. It consists of two cup-shaped receptacles, each 100 mm in diameter mounted at right angles to each other at the end of a rod. Each receptacle contains a plug of cotton wool impregnated with petroleum. The apparatus is constructed of acetyl-cellulose and so is transparent and unbreakable. A //

YELLOW FEVER.

PRÉCIS OF ABSTRACTS IN THIS SECTION

A table is given by JAMES (p 19) showing the distribution of yellow fever in South America and Africa for the 6 months ending 31.3.1938. The epidemiological value of the protection test is shown and it is now being used in Uganda and the Sudan. Attenuated neurotropic virus in homologous serum was used for immunization with good results. Jaundice following vaccination is probably due to a filterable virus contaminating the serum used or possibly cultivated with the yellow fever virus. The development of antibodies is slow after vaccination but they persist in full strength for at least one year. SOPER (p 20) records that pantropic virus (17 D) cultivated on fowl embryo tissue from which the brain and spinal cord have been removed to prevent neurotropism has been used since 1934 for the vaccination of 168 000 persons in Brazil. The method of preparation is described. No serious ill effects have been seen and immunity was complete in 42 of 45 persons tested for it. Viscerotomy is essential in detecting early cases in an epidemic. BAUER (p 20) states that jungle yellow fever may cause well marked epidemics but the method of transmission is still obscure. Monkeys however probably constitute the most important factor in the spread of this disease according to SOPER (p 20).

SOREL (p 21) notes that yellow fever has increased in the French Colonies and O BRIEN (p 21) analyses an outbreak in British West Africa. CROUCH (p 21) describes a few protection tests found to be positive in cases of febrile jaundice in Malakal where however *Aedes* are scarce. SCHÜFFNER *et al* (p 22) discuss the finding that in spite of the absence of yellow fever from Surinam since 1908 11 per cent of 233 persons living there since that date were found to give positive protection tests. A description of an outbreak at Zongo is given by VAN CAMPENHOUT (p 22). The effects produced by Laigret's method of vaccination are described. The value of the mouse protection test in epidemics of uncertain nature is indicated and its limitations stated by the Commission (p 23). Mass vaccination is the only practical method of prophylaxis in the jungle population.

DINGER (p 23) discusses possible measures against yellow fever in the Dutch East Indies. CLERC (p 24) in discussing the epidemic on board the *Sea Rambler* considers that there are arguments against its having been yellow fever though the laboratory tests were very strongly in favour of it. SCHÜFFNER, WALCH SORDRAGER and HOEKSTRA (p 25) consider that jungle yellow fever in Surinam is epizootic and transmissible to man in whom it is a slight or masked infection different in clinical form from yellow fever. PATIÑO CAMARGO (p 25) notes that cases of yellow fever and influenza occurred simultaneously in Guadeloupe in 1929. It is not possible to say how many of the influenza cases were really yellow fever. He details the vectors of Colombia. ARAGÃO (p 26) describes a small outbreak in São Paulo.

SHANNON WHITMAN and FRANCA (p 27) found that *Aedes leucocelaenus* and *Haemagogus capricornis* were the only two species which were infective by bite and which were thus incriminated as natural vectors among 24,304 wild mosquitoes of some 30 different species

caught alive at points near where human infection had occurred in an outbreak of jungle yellow fever but an emulsion of 88 Sabethlines caught in the same neighbourhood as the infected *Harmagopus* and injected intracerebrally into mice produced yellow fever encephalitis. HUNN and NOVIS (p. 28) studied the habits of 80 species from a jungle yellow fever area. LIXS (p. 28) describes a fatal case of jungle yellow fever. The larval index of *Aedes aegypti* in various parts of Africa is mentioned on page 28.

TIBIRIÇA (p. 29) gives a full account of the microscopical appearances of the liver in yellow fever and DA ROCHA LIMA points out that the evidence provided by a number of changes in the cells must be considered in making a diagnosis.

FINDLAY and MACCALLUM (p. 30) found that 89 cases of jaundice occurred in 3100 persons vaccinated with virus and immune serum. They think it to be due either to a hepatotoxic virus in the inoculum or a combination of hepatotoxic substance and an infective agent probably that of common infective hepatic jaundice [see also above JAMES]. LEFÈVRE and CAMBESVÈNKS (p. 30) describe methods of vaccination. LLOYD (p. 31) calls attention to the difficulty of the diagnosis of yellow fever in specimens obtained by blood surveys. The necessity for anti mosquito measures and vaccination in endemic areas is stressed by BARTHAS (p. 31).

MACKIE and CRAWFORD (p. 32) give an account of a method of dissemination of aircraft by means of spray and nebulizer using a watery base pyrethrum insecticide.

SALEUX, CECALDI and PALMADICI (p. 32) describe the isolation for the first time of a strain of yellow fever virus in the French Congo. It was found to be indistinguishable from the Dakar strain. DE ASSUMPTIÃO (p. 33) shows the essential identity of a strain of the jungle yellow fever virus isolated in São Paulo and a Dakar neuro-tropic strain, though the São Paulo strain was apparently slightly less virulent than the other.

- I. JAMES (S. P.) Renseignements sur la fièvre jaune reçus au cours des six mois écoulés jusqu'au 31 mars 1938. [Information on Yellow Fever received during the Six Months ending March 31st, 1938.]—*Bull. Office Internat. d'Hyg. Publique* 1938. June Vol. 30. No. 6. pp. 1197-1204.
- II. SORLEY (Fred L.) Situation de la fièvre jaune au Brésil. [The Yellow Fever Position in Brazil.]—*Ibid.* pp. 1205-1208.
- III. SORLEY (F. P. J.) Les cas de fièvre jaune dans les colonies françaises en 1937. [Yellow Fever Cases in French Colonies during 1937.]—*Ibid.* pp. 1209-1217.
- IV. O'BRIEN (A. J. R.) La fièvre jaune en Nigeria et Gold Coast en 1937. [Yellow Fever in Nigeria and Gold Coast during 1937.]—*Ibid.* pp. 1218-1222.
- V. CROUCH (H. A.) Sur la situation de la fièvre jaune à Malakal. [The Yellow Fever Position in Malakal Upper Nile Province, Sudan.]—*Ibid.* pp. 1223-1227.
- VI. SCHUFFNER, WALCH-SORDEBRAGER & HOEKSTRA (M.) Sur la persistance de la fièvre jaune en Guyane Hollandaise démontrée par le test de protection de la souris. [The Persistence of Yellow Fever in Dutch Guiana, demonstrated by the Mouse Protection Test.]—*Ibid.* pp. 1228-1236. With 2 figs.

- vii. VAN CAMPENHOUT (J) Sur une épidémie suspecte d'être due à la fièvre jaune survenue à Zongo (Congo Belge) [A Suspected Epidemic of Yellow Fever occurring at Zongo (Belgian Congo)]—*Ibid* pp 1237-1241
- viii. — Enquête de protection amarile au Ruanda Urundi. [An Inquiry of Yellow Fever Protection in Ruanda-Urundi.]—*Ibid* p 1242.
- ix BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE 1938 June. Vol. 30 No 6 pp 1243-1245—Rapport de la commission de la fièvre jaune [Report of the Yellow Fever Commission.]

1. The number of cases of yellow fever notified during the six months ending 31st March 1938 are indicated in the following table —

South America

Country	State	No of localities with cases	No of cases	No of deaths
Brazil	Minas Geraes	31	—	100
	Pará	1	1	1
	Santa Catharina	1	1	1
	Rio de Janeiro	10	19	16
	São Paulo	1	14	—
	District Federal	2	2	2
	Cayua	1	12	3
Colombia		5	9	9
Paraguay		1 (Asuncion)	1	1

Africa

Belgian Congo		2	16	10
French West Africa—	Dahomey	1	5	—
	Ivory Coast	5	6	4
	Senegal	13	29	21
	Soudan	2	3	3
French Equatorial Africa	Oubangui-Chari	1	1	1
British West Africa	Gold Coast	13	18	12
	Nigeria	6	8	6

These figures do not differ markedly from those of the preceding six months but fewer cases have been notified from towns the majority coming from villages or rural districts with a high larval index.

With reference to epidemiology attention is called to additional evidence in support of the value of the protection test in mice as an indication of the distribution of the disease. At Entebbe Uganda the Government is helping the Rockefeller Foundation to investigate the nature of fevers of unknown origin by inoculating the blood of patients into mice. This inquiry is in progress in the regions west of the Nile in the Uganda forest in the Ruwenzori district and in the south of the Anglo-Egyptian Sudan.

Immunization is now being carried out by a single inoculation of neurotropic virus attenuated by culture suspended in 0.25 to 0.5 cc. homologous serum. Dr Sawyer reports that since 1st January 1937 in Brazil 80,000 persons have been vaccinated by this method without any complications being observed. Dr Findlay records that in London during the past five and a half years 4,300 Europeans have been vaccinated before proceeding to yellow fever countries, and not a single case of the disease has occurred among them. During this same period some 30 Europeans in these areas became infected, none of whom had been vaccinated. Col Mackie reports that the regulations now require the vaccination of all Government servants serving in British West Africa and the R.A.F. applies similar rules for those serving in yellow fever districts.

Attention is called to the occurrence of jaundice following yellow fever vaccination noted by FINDLAY and MACCALLUM (see this *Bulletin* 1938, Vol. 35:119) who found that 2.9 per cent. out of 4,300 had shown this symptom. Col Mackie records 6 per cent. out of 54 R.A.F. personnel. The cause of this jaundice is supposed to be a filterable virus inoculated with the serum and it may have been cultivated in association with the yellow fever virus, since recently Findlay has used a new strain of culture virus for 1,100 vaccinations without any of the patients developing this symptom.

An interesting letter from Dr J. H. BAUER giving supplementary notes on yellow fever in Brazil is reproduced. It confirms the view that jungle yellow fever may cause well marked epidemics. Its method of transmission however still remains obscure. Evidence of its spread is afforded by the occurrence of fatal cases in middle-aged persons who had been born and lived all their lives in the same locality.

Since last summer more than 200,000 persons in Brazil alone have been vaccinated by the method described above. Ninety per cent. have shown no reaction whatever and in the remaining 10 per cent. reactions of varying intensity have occurred generally on the 6-8th day after inoculation. There has not been a single death nor any other complication such as jaundice.

The examination about a month later of the serum of vaccinated subjects showed the existence of immune bodies in at least 85 per cent. of the patients but it would seem that the development of antibodies is rather slow and may go on increasing for about three months. Patients examined a year later showed no diminution in the degree of immunity.

ii Details are given of yellow fever vaccination in Brazil. A pantropic virus known as 17D which had been cultivated on fowl embryo tissue since 1934 by Wray LYON (see this *Bulletin* 1936 Vol. 33:627) has been used since February 1937. During 1937 38,387 persons in Brazil were vaccinated with this virus, and by the end of March 1938, the number had reached 188,000. Among the first 200 persons vaccinated at Rio de Janeiro about 20 per cent. showed symptoms attributed to the virus but in no case were they sufficient to necessitate stopping work. In 12 out of 29 patients carefully examined, small quantities of virus were found to be present in the blood for one day or more between the 4th and 10 days after inoculation. Out of 45 examined later for immunity 42 gave complete protection, one partial, and 2 were negative. Of the latter one patient had shown no immunity reaction after inoculation with another virus, and the other had received only a very small dose of virus.

The virus used for inoculation is prepared by injecting the tissue culture strain into fowl embryos within the egg shell. After incubating these eggs for some days a higher concentration of virus is obtained than in tissue cultures. The embryos are then ground up in normal human serum to make a 10 per cent. suspension, which is dried and stored in ampoules. It is essential that the virus should be living when used for vaccination and although the dried virus will live for long periods at low temperatures it is advisable to test the batches before use as a case occurred in which the virus had become inactive. No cases of jaundice have been observed in inoculated subjects nor any other serious after-effects within a year of vaccination.

With reference to yellow fever in South America recent observations show the very great importance of the jungle form of the disease which is evidently widely distributed. Viscerotomy is found to be invaluable and the early cases of recent outbreaks were all discovered by this method. The present outbreak in the States of Minas Geraes and Rio de Janeiro has been associated like many others with an increased mortality among the howler monkeys and protection tests on numerous wild animals support the view that various species of monkeys constitute probably the most important factor in the spread of jungle yellow fever.

iii. During 1937 there has been a distinct increase in the number of cases of yellow fever recorded from French Colonies. A total of 48 including 40 from West Africa, 1 from the Cameroons and 7 from Equatorial Africa is reported. Forty four of the cases were fatal including 23 Europeans, 18 Syrians and 3 natives. The diagnosis was confirmed in 43 cases by histological examination of the liver. Interesting details of these cases are given including their clinical histories and distribution. Two of the patients had been vaccinated against yellow fever (presumably by Laigret's method) one only four days and the other about eighteen months before the appearance of symptoms of the disease. The author recommends testing the blood of vaccinated subjects one month after inoculation to determine the degree of immunity acquired and a year later to test its persistence.

iv. An analysis of cases of yellow fever occurring in Nigeria and the Gold Coast during 1937. Of the 81 from the Gold Coast 68 occurred in the Eastern, 6 in the Western and 3 in the Central Province and 4 in the Northern Territories.

The main characteristic of this outbreak has been the mortality among Africans 74 cases with 65 deaths including an infant aged only three months. In addition there were four cases all fatal among Syrians and three cases, all fatal, among Europeans. The majority of the deaths occurred about the fifth day of the disease and intra nuclear inclusions were easily found in all the livers examined although in previous cases they had not been found. The principal factor for the concentration of cases in the Eastern Province seems to be the water stores in the rural districts and the necessity of preserving every available drop of water.

v. During 1933 protection tests were made on 50 sera in Malakal only one of these sera from an adult was positive. At the end of 1935 a fatal case suggestive of yellow fever occurred in a man from Eliri in the Nubian Mountains and the results of protection tests on 27 sera from that region gave 12 positive and 15 negative. During 1936 out of 10 sera from cases of febrile jaundice in Malakal, one was

positive. During 1937 12 cases of febrile jaundice occurred there 4 out of 11 examined gave positive protection tests in mice. Clinical details are given of these 4 cases all of whom recovered. With reference to the occurrence of *Aedes aegypti* at Malakal, during 1937 124,241 inspections were carried out and only 5 adult mosquitoes and 14 cases of larval infection were found. During the last quarter when two suspected cases of yellow fever occurred, no *Aedes* were found. As a precautionary measure the aerodrome at Malakal has been considered as situated in an infected zone and the usual anti yellow fever methods applied.

vi. The last two epidemics of yellow fever in Paramaribo Surinam occurred in 1902 and 1908, since when no case has been recorded. The authors have carried out protection tests in mice with the sera of 369 persons from Surinam and the results are divided according as to whether the subject lived there before 1908 or since then.

Of those living in Paramaribo before 1908 34 out of 60 were positive compared with 25 out of 233 of those living there since that date. This latter figure of 11 per cent. is rather surprising in view of the absence of any records of the disease and suggests the occurrence of small epidemics. Of those living in the interior including Indians and forest negroes the percentage infected has remained the same (16 per cent.) whether they were born before 1908 or since then. Three out of 19 were positive in the former group and 9 out of 57 in the latter. Only 1 female out of 25 was positive compared with 8 males out of 35 examined.

Finally the authors give the results of protection tests carried out on the members of the staff of the yellow fever laboratory in Amsterdam. Out of 6 persons coming into daily contact with the virus 4 were positive and 2 negative. Out of 10 persons rarely coming in contact with the virus only one gave a positive protection test.

In addition 95 inhabitants of the Netherlands who had never been exposed to the chance of infection were examined and all were negative.

vii. The description of an outbreak at Zongo on the Oubangui involving 17 cases with 9 deaths. The symptoms included headache pain in the joints, liver and epigastric region, mucous vomits, slight jaundice, the urine containing numerous cylindrical casts and typhoid state with terminal delirium. Two mice inoculated with the serum of a patient died with paralysis on the fifth day. The livers of four of the patients did not show lesions characteristic of yellow fever and out of seven sera only one gave a positive protection test and since 29 per cent. of the general population were positive in 1935 this single positive is considered of no significance. However precautionary measures were taken against it being a modified form of yellow fever especially in view of the fact that in the French territory on the other side of the river yellow fever lesions were found in the liver of a patient who died with similar symptoms.

The author gives the results of using Lalagret's method of vaccination in 30 Europeans. 10 had slight reactions and needed rest. 13 severe reactions about the 6th day lasting for 3 days. 5 serious reactions on the 14th day lasting for 10 days and 2 severe reactions from the 21st day onwards. Meningeal symptoms, with violent headaches and frequent vomiting, were present in the severe cases. The reactions in

natives were generally much less severe but cases occurred which necessitated hospitalization of the subjects

viii An examination of 50 sera from natives of this region by the mouse protection test gave 49 negative and 1 positive

ix. The Commission directed its attention to five main points

(a) With reference to the value of the mouse protection test for the diagnosis of yellow fever it is not recommended for the diagnosis of doubtful febrile disease it is not recommended for the diagnosis in a community suffering from an epidemic of uncertain nature when the only of real value for making a retrospective diagnosis is a number of positives is well above that of the surrounding population and where previously negative persons become positive after recovery

(b) It is suggested that laboratory experiments that a virus not attenuated by prolonged culture may occur in the peripheral circulation and be transmitted by a mosquito feeding on such blood On the other hand cultured virus such as strain 17D in Brazil has a very attenuated virulence and experimental attempts to transmit the virus by mosquito have been negative (c) With regard to the use of prophylactic vaccination against jungle yellow fever mass vaccination is now recommended in view of the new methods of preparing vaccine and at present this would seem to be the only practical means of anti yellow fever prophylaxis among the jungle population This recommendation only relates to the jungle form and does not in any way imply the abandonment of other preventive methods in urban districts (d) It is considered desirable that before use each batch of vaccine should undergo a test for vitality and titration of virulence and that vaccinated persons should be tested for immunity not earlier than one month after vaccination It is not at present possible to fix any period for the duration of this immunity

E Hinde

DANGER (J E) *Nieuwere inzichten omtrent de epidemiologie en bestrijding der gele koorts en hante beteekenis voor Nederlandisch Indië* [Significance of Present Knowledge of Yellow Fever for Netherlands India.]—*Geneesk Tijdschr v Nederl Indië* 1933 May 31 Vol 78 No 22 PP 1292-1310 [55 refs]

A detailed full introduction presents the facts that are known of the distribution of yellow fever Then comes the question What importance have these known facts for Netherlands India? Much turns here upon the mouse test which has revealed the existence in latent subclinical form of yellow fever not only on the west coast of Africa but also in the whole of equatorial Africa The danger which suggests itself is that with the development of air travel endemic areas will be rapidly connected up with air ports such as Vaurobi for example on the Cape-Cairo route Anti yellow fever landing places are already being set up at Juba and Malakal by the Anglo-Egyptian authorities Those countries which adhered to the regulations of the International Air Convention are now likely to be faced with difficulty over the interpretation of the words biologically recognizable form of yellow fever An attempt has been made to deny the specificity of the mouse tests which are now likely to be faced with difficulty over the interpretation of the words biologically recognizable form of yellow fever hygienists recognize their specific tests, but the great majority of What it is asked should be done in the matter by the Netherlands Indies Government? Can the quarantine regulations be rendered

more stringent? Mouse tests are scarcely possible as they require the use of yellow fever virus and the importation of this virus is banned by law. Vaccination on a large scale could scarcely be considered unless the menace of yellow fever became acute. This procedure moreover comes under the same ban as applies to the mouse test. Again, it is not even thinkable that an anti-*Aedes* campaign should be commenced. What seems feasible and called for is to make preparations for such a campaign by special surveys of breeding places of *Aedes*. Regulations should at least be drafted to meet the necessity for action when it arises

W F Harvey

CLERC (Marcel) L'épidémie de fièvre jaune du "Sea Rambler"
(1936) The Epidemic of Yellow Fever in the "Sea Rambler"
(1938) —*Re Méd et Hyg Trop* 1937 Nov.-Dec. Vol. 29
No 6. pp 281-292.

A discussion of the epidemic on board the "Sea Rambler" in 1936 which was diagnosed as yellow fever by Dr P. G. STOCK [see this *Bulletin* 1937 Vol. 34 p. 683].

It may be recalled that this epidemic broke out among a crew of 24 about a week after the ship had left Dakar but previously had been for two weeks in Kaolakh and Zighinchor below Gambia where mosquitoes were said to be very troublesome when loading cargo before returning to Dakar. On arrival at Madeira, various members of the crew became ill, and at Funchal the port authorities considered it an outbreak of food poisoning. Seven of the crew died five remained in hospital at Madeira and two of the original crew who had been ill, remained on the ship. Eight new men were recruited at Madeira and the ship returned to Sunderland.

An investigation of this epidemic was made by the port authorities. Dr FINDLAY examined the blood of 14 of the crew. Six gave positive mouse protection tests against yellow fever including four of the crew hospitalized at Madeira and the two patients who remained on duty whilst the eight new members of the crew recruited in Madeira all gave negative tests. Agglutination tests against *S. icterohaemorrhagiae* made by Major H. C. BROWN gave negative results with all the sera examined, thus excluding the possibility of Weil's Disease. Agglutination tests were also made to exclude *Salmonella* infection. Finally the blood of two patients was examined for malaria parasites, also with negative results.

In spite of these strong arguments the author is of the opinion that there are certain arguments against the diagnosis of yellow fever.

All the cases occurred within eight days, and therefore one must assume that they were bitten by infected mosquitoes at more or less the same time. But there were no subsequent cases although one might have expected some of the mosquitoes on the ship to have become infected by feeding on the patients and thus to produce a new series of cases after the usual incubation period. A much more serious objection is the absence for many months previously of any notifications of yellow fever from the localities visited by the "Sea Rambler" and the fact that no other ships from these localities have records of similar outbreaks. On the other hand cases of malaria are common on ships returning from the west coast of Africa and details are given of serious outbreaks among crews causing the deaths of several members.

The complete absence of black vomit among the cases on the Sea Rambler is also noteworthy since all the described symptoms exist in other diseases and especially malaria. The laboratory tests however would seem to provide overwhelming evidence in support of the diagnosis of yellow fever.

In the discussion following this paper BOYÉ disputed the value of the mouse-protection test and rejected the diagnosis of yellow fever because of the absence of black vomit. STEFANOPOULO whilst admitting that no serological reaction is absolutely infallible stated that the results of serum protection tests for the diagnosis of yellow fever had been of great value and could not be ignored even in certain cases the results seemed open to question.

SCHÜFFNER (W) WALCH SORDRAGER (B) & HOEKSTRA (J) Laatste resultaten van het onderzoek naar het voorkomen van Gele koorts in Suriname [The Occurrence of Yellow Fever in Surinam].—*Geneesk Tijdschr v Nederl Indië* 1938. Mar 15 Vol 78 No 11 pp 571-592.

Two epidemics of yellow fever have occurred in this century in Paramaribo the capital of Dutch Guiana on the Surinam River one in 1902 and the other in 1908. It is well known that the immunity after yellow fever may be taken to be life long. Now that we have in the mouse a method of testing this immunity, it became possible to estimate what permanent effect epidemics had left upon the population of Surinam. It was found that 58 per cent of the people had a serum which was strongly protective for mice. In the same age group of Indians and bush negroes among whom no epidemic had occurred a 16 per cent immunity was demonstrated. This immunity is placed to the account of the jungle form of yellow fever so far as relates to the clinical manifestations. In these matters the authors agree more or less closely with the American workers. Jungle fever is not a serious disease and it would seem that it can easily be overlooked. This explanation is forthcoming for the existence of immunity among jungle folk. But what of the immunity found to exist in the people of younger age in Paramaribo and district? No epidemic is recorded which could have affected them or account for their 11 per cent immunity (reduced to 5-6 per cent, with more stringent test). A lengthy argument centres round this immunity and other points in the text and the conclusion is drawn that it can only be due to a jungle type of the fever. This jungle type is to be regarded as being an epizootic and as capable of transmission to man in whom it is a slight or masked infection. Nothing is yet known regarding the nature of the enzootic.

PATINO CAMARGO (Luis) Notas sobre fiebre amarilla en Colombia. [Yellow Fever in Colombia].—Reprinted from *Rev Facul de Med de Bogotá* 1937 Nov Vol 6 No 5 74 pp With 4 maps [115 refs.]

The author in the opening sections of this article gives a general account of yellow fever its source and early outbreaks applying it locally to Colombia. To readers of this *Bulletin* important parts are

those giving the dates of outbreaks of which 45 are listed between 1830 and 1900 and another 23 between 1900 and 1929. In the table of the first information is given of nine only, and that is very meagre a statement being made of the duration of the outbreak, the population and the mortality. In seven the actual figures, in two the percentages only (presumably case mortality). In the second table of twenty-three ten places are mentioned as being free from *Aedes aegypti* and in two others they were very scarce and the outbreaks were very likely of the rural type. FRANCO MARTINEZ and TORO concluded that the Muzo outbreak of 1907 was a mixture of yellow fever and leptospirosis (*icterohaemorrhagiae*). In the Socorro outbreak (Santander) of 1929 there were 150 cases, 100 mild, 50 severe and 37 died. In Guadalupe, adjacent to Socorro, cases occurred in January and February, some being diagnosed as influenza. This outbreak was studied by PEÑA CHAVARRIA, SERPA and BEVIER and they came to the conclusion that a certain number definitely suffered from yellow fever but they are unable to say how many, or what proportion of the "influenza" cases were cases of yellow fever.

The author states that vectors conveying the infection in Colombia by their bite are five namely *Aedes aegypti*, *Aedes scapularis*, *Aedes taeniorhynchus*, *Aedes fluviatilis* and *Culex fatigans* (this occasionally transmits but more often fails). Others are infective if the triturated bodies are inoculated into *M. rhesus*, *Aedes serratus*, *Aedes terreus*, *Psorophora cingulata*, *P. ferox*, *Mansonia fasciolata*, *M. chrysomelum*, *M. illians* and *Culex fatigans*. A list of 117 species of mosquitoes found in Colombia is also given. The *Aedes aegypti* index varies greatly in a district. Thus in Cúcuta in 1923 it was 90 per cent. In 1932 none was found. In Bucaramanga in 1923 it was 86 per cent. in 1932 nil. In Barranquilla in 1923 51 per cent., in 1932, 72 per cent. in Santa Marta 64 and 17 per cent. in 1923 and 1932 respectively.

The article ends with a sketch of the measures taken by the National Department of Hygiene co-operating with the staff of the Rockefeller Foundation and recommendations both on the usual lines of examining samples of blood for the protection test, viscerotome sections, epidemiological and entomological studies, vaccination and determination by spot maps of distribution and so forth. H. H. S.

ARAGÃO (Henrique de Beaupre) Observações a respeito de um foco limitado de febre amarela silvestre no estado de São Paulo [A Limited Focus of Rural Yellow Fever in the State of São Paulo].—*Brasil-Médico* 1938, Apr. 23, Vol. 52, No. 17, pp. 401-412. With 1 map.

The locality affected is in the municipalities of Presidente Wenceslau and Santa Anastácio, some 870 kilometres from São Paulo and 400 metres above sea level. Between 14th December 1937 and 8th February 1938 there were twenty-one cases, four of them fatal. The diagnosis was made on clinical, epidemiological and serological grounds, and by examination of the liver in the fatal cases. The serological tests comprised inoculation into white mice and *rhesus* monkeys. Anti-armyax vaccinations were performed on the inhabitants between the 14th and 25th January 7,784 in Presidente Wenceslau and on the 29th January 315 in Santa Anastácio. None showed any untoward symptoms worthy of note after the inoculations, a few had a transient

rise of temperature malaise and nausea. During the time of vaccination two cases occurred in the unvaccinated and a week after vaccinations ceased another case occurred a man who had been away and had not been vaccinated. A map of the district is reproduced in the article but on so reduced a scale as to be undecipherable. A list of the mosquitoes caught in the district is given and includes *Aedes serratus* *scapularis* *fulvus* and *leucoclaenus*. H H S

VASSILIADIS (P Ch) *Épidémiologie de la fièvre jaune telle qu'elle se présente actuellement* [The Present Epidemiology of Yellow Fever]—C R Soc Méd et Hyg Trop d'Égypte Alexandria 1936-1937 8th Year pp 43-55

A general review of the subject

E H

SHANNON (R. C) WHITMAN (Loring) & FRANCA (Mario) *Yellow Fever Virus in Jungle Mosquitoes*.—*Science* 1938. July 29 Vol 88 No 2274 pp 110-111

During the 1938 outbreak of jungle yellow fever in the state of Rio de Janeiro the authors had mosquitoes collected from points where human infection had occurred and forwarded daily to the laboratory at the capital.

Out of 24,304 wild mosquitoes sent in during a period of eleven weeks yellow fever infection was produced in two monkeys by the bites of *Aedes leucoclaenus* (Dyar and Shannon) and *Haemagogus capricornis* (Lutz) respectively. The mosquitoes tested are indicated in the following table —

List of Wild-caught Mosquitoes Tested for the Presence of Yellow Fever Virus

Group	Species	Used	Fed	Remarks
1	<i>Aedes scapularis</i> (Rondani)	180	100	
2	<i>A. leucoclaenus</i> (Dyar and Shannon)	4 671	2,270	Positive by bite.
3	<i>Haemagogus capricornis</i> (Lutz)	1 216	646	" "
4	<i>Psorophora ferox</i>	253	143	
	<i>P. albipes</i>	15	7	
	<i>A. fulvus</i> (Wiedemann)	8	5	
	<i>A. serratus</i> (Theobald)	1 570	545	
	<i>A. terreus</i> (Walker)	503	59	
5	<i>Sabethes</i> 3 species	1 092	369	
6	All other sabethines (<i>Sabethodes</i> <i>Limatus</i> <i>Wyomyia</i> <i>Goeldii</i> and <i>Trichoprosopon</i> (<i>Joblotia</i>) totalling about 20 species	14 786	3 443	Positive by injection.

In addition to the positive results obtained in the feeding experiments, which prove that these two species of forest-inhabiting mosquitoes are natural vectors of yellow fever the intracerebral injection of fluid from an emulsion of 118 *Haemagogus capricornis* into mice produced typical yellow fever encephalitis and similarly positive

results were obtained by the inoculation of 88 specimens of *Sabethine* mosquitoes. These results are of very great interest as constituting the first definite evidence as to the species concerned in the natural transmission of jungle yellow fever in Brazil. E H

KUM (H W) & NOVIS (Oswaldo) Mosquito Studies on the Ilha de Marajó, Pará, Brazil.—*Amer J Hyg* 1938. May Vol. 27 No 3 pp. 498-515 With 2 maps 1 graph & 2 plates. [11 refs.]

A total of 10 121 adult mosquitoes and 1 260 larvae representing 80 different species were collected in an area where jungle yellow fever was known to have occurred. No specimens of *Aedes aegypti* were found. The most common species biting man by day in the forests were *Aedes nubilus* *Psorophora ferox* and *Haemagogus janthinomys*. The daily curves of activity of these three species showed significant differences *Aedes* being predominantly crepuscular *Haemagogus* occurring especially about noon and *Psorophora* showing both morning and afternoon peaks of activity. Wide variations were found in the abundance and variety of mosquitoes occurring in the two main types of forest in this region. E H

BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1938. Sept Vol. 30 No 9 pp 1970-1978. With 1 map Renseignements relatifs aux index *Aedes aegypti* dans les divers pays d'Afrique pour 1937 I. A. Relevé des index larvaires dans les centres de la Côte de l'Or en 1937 B. Relevé des index larvaires dans les centres de la Nigéria en 1937 C. Index *Aedes aegypti* au Kenya [O'BRIEN (A. J. R.)] II Distribution et incidence d'*Aedes aegypti* au Soudan Anglo-Egyptien en 1937 [PRIDIE (E. D.)] [Data on the Larval Index of *Aedes aegypti* in the Gold Coast, Nigeria and Kenya in 1937 Distribution and Abundance of *Aedes aegypti* in the A. E. Sudan in 1937]

The papers give information on numbers of *Aedes aegypti* found in human habitations in the Gold Coast Nigeria, Kenya and the Anglo-Egyptian Sudan. The larval index "i.e. the percentage of buildings and compounds in which larvae of this species were found, is used as an expression of the insect's commonness.

There appears to be a healthy rivalry, between these territories and even those in West Africa feel able to report indices much below 1 per cent. As to who collected the figures, or how thoroughly the reader must judge for the authors do not help him. P 4 Barton

LIXA (Sinval A.) Caso classico de febre amarela de origem sylvestre. [A Typical Case of Jungle Yellow Fever]—*Folia Med* 1938. May 5 Vol. 19 No. 13 pp 149-153 With 1 chart & 2 figs.

A Brazilian of 29 years of age robust and of good physique an engineer by profession was working for the telephone company in Barra Mansa, Rio State and Bananal in São Paulo where no *Aedes* is to be found. He was seized with shivering headache and marked prostration, with early vomiting. The next day the urine diminished owing it was thought to the vomiting. The last developed to black vomit and there was almost total suppression of urine. He was

brought to Rio on the fourth day of illness and died on the sixth day. An autopsy was performed and the findings are described. These need not be detailed here they were those characteristic of yellow fever. Photomicrographs show well the destruction of the liver cells and the condition of the kidney tissue.
H H S

IBIRICA (Paulo O T) *Pathologia microscopica do fígado na febre amarella* [Histology of the Liver in Yellow Fever]—*Ana Paulist Med e Cirurg* 1938 May Vol. 35 No 5 pp 429-452. With 6 figs 40 refs; English summary

This is an account of a careful painstaking study of the microscopical anatomy of the liver in yellow fever and also of the chemistry of the changes observed. Bile pigment was seen to be retained in the hepatic cells proper and in the Kupffer cells many of these cells were necrosed. The author discusses with a good deal of supposition, unchanged, the nuclei appeared oedematous at first later when the chemical changes brought about and the method of their production. The jaundice he regards as haematogenous at first later when damage to the liver cells interferes with their function, it is hepatogenous or a mingling of the two. The photomicrographs reproduced in the article are not very convincing probably colouring is needed to demonstrate the points stressed.
H H S

DA ROCHA LIMA (H) *Rückblickende Betrachtungen ueber die Entwicklung der Histodiagnose des Gelbfiebers*. [A Retrospective View of the Development of the Histo-Diagnosis of Yellow Fever]—*Reprinted from Festschrift Bernhard Nocht's 80 Geburtstag von seinen Freunden u Schülern Hamburg* 1937 pp 497-512. [33 refs.]

The author gives an interesting historical review of the subject including extracts from the publications of various pathologists showing the manner in which his early work of 1912 had been over looked possibly owing to the fact that at the time his views were not generally accepted. Attention is called to the fact that it is impossible to base the histological diagnosis of yellow fever on any single character such as hyaline necrosis etc but only by a careful consideration of the evidence provided by a number of changes in the cells. The author stresses the importance of correct diagnosis and calls attention to some of the difficulties encountered by inexperienced observers.
E H

BABLET (J) *Sur le diagnostic différentiel de la fièvre jaune (examen histologique du foie)* [The Differential Diagnosis of Yellow Fever Histological Examination of the Liver]—*Arch Insts Pasteur d'Indochine* 1937 Oct Vol. 7 No 28 pp 177-185 With 5 figs, on 5 plates.

A summary of the methods employed by the author together with brief account of some previous work on the subject [see this Bulletin 1936 Vol. 33 p 334]
E H

FINDLAY (G M) & MACCALLUM (F O) Hepatitis and Jaundice associated with Immunization against Certain Virus Diseases.—*Proc Roy Soc Med* 1938, May, Vol. 31 No 7 pp 799-805 (Sect. of Comp Med. pp. 35-41) [12 refs.]

Among 3 100 persons immunized against yellow fever by the use of virus and immune serum over a period of five years 89 cases of jaundice have been traced.

The symptoms closely resemble those produced by common infective hepatic jaundice cases of which have often been noted as occurring in the same areas. Cases almost always tend to occur in groups in regional areas and have been observed in England Egypt Anglo-Egyptian Sudan South Africa and the West African Colonies while apart from this series jaundice has followed yellow fever immunization in South America and in French Gabon. The average period between the time of inoculation and the development of hepatitis has been two to three months. It is of interest that hepatitis in horses has also been noted to occur two to three months after immunization against the virus of horse sickness and equine encephalo-mylitis and also after the injection of horse serum containing anti-toxins against *Ct. arabis* toxina.

The only common factor between the two was the injection of homologous proteins either in sera or tissue extracts. The only theories which at present explain the observed facts are that either (1) a hepatotoxic virus is introduced with the virus inoculum or that (2) two factors combine to induce the hepatitis—(a) a hepatotoxic substance present in the homologous sera or tissue extract inoculated and (b) an infective agent which at least in the case of human beings, is probably the causal agent of common infective hepatic jaundice

E H

LEVÊQUE Note sur l'utilisation du vaccin antiamaril de l'Institut Pasteur de Tunis dans la région nord du Cameroun [A Note on the Use of Anti-Yellow Fever Vaccine from the Pasteur Institute, Tunis, in the Region North of the Cameroons].—*Arch Inst Pasteur de Tunis* 1938, Mar Vol. 27 No 1 pp. 108-110 With 1 fig

A note on the results of vaccinating 35 Europeans and 29 natives with single injections of neurotropic mouse yellow fever virus coated with egg yolk. Only mild reactions were observed except in two cases both Europeans one of whom showed an attack of fever on the 14th day rising to 40°C and lasting for about five days. E H

CAMBRÉSINI (H) A propos de l'état actuel des vaccinations contre la fièvre jaune. [The Present Position of Vaccination against Yellow Fever].—*Rev Méd et Hyg Trop* 1937 Nov-Dec Vol 29 No 6 pp 273-279

A general review of the development of methods of vaccination against yellow fever up to the use of attenuated culture virus. In the discussion Dr STEFANOPOULO mentioned that the number of subjects in Brazil, vaccinated by this latter method, then reached more than 32,000 without any serious ill-effects having been observed. E H

LLOYD (Bolivar J) The Role of Viscerotomy in the Diagnosis and Control of Yellow Fever—*J Trop Med & Hyg* 1938 June 15 Vol 41 No 12 pp 197-200

A general account including interesting personal reminiscences in which the author emphasizes the importance of accurate diagnosis in order to avoid unreasonable quarantine measures. Viscerotomy is admitted as a simple and convenient method of obtaining specimens from the deep viscera but the diagnosis of yellow fever from pathological conditions found in the liver requires a very skilled observer. Cases are mentioned of the erroneous diagnosis of yellow fever from examination of liver tissue by admitted authorities and the author is of the opinion that one should not accept as final a diagnosis of yellow fever based entirely on the microscopic appearance of the liver. All outbreaks classed as yellow fever should be checked by blood surveys and it is considered that seasoned men of known administrative ability should take the responsibility of evaluating all evidence before the opinions of the pure scientist are made a basis for administrative action. E H

BARTHAS (E) Possibilités d'expansion et prophylaxie de la fièvre jaune. [Possibilities of the Expansion and Prophylaxis of Yellow Fever]—*C R Soc Méd et Hyg Trop d'Egypte* Alexandria. 1936-1937 8th Year pp 56-70

A general discussion with special reference to the possibility of the spread of yellow fever into Egypt and the Indies. Attention is called to the necessity of maintaining anti mosquito campaigns in all infected or menaced regions combined with anti yellow fever vaccination in endemic areas. E H

LANCET 1938 June 18 p 1414—Destruction of Mosquitoes in Aeroplanes. A Test Flight.

The risk of conveyance of infection by mosquitoes in aeroplanes is well recognized but to deal satisfactorily with that risk has been no easy matter. It is difficult to ensure that every aeroplane at a port of disembarkation is free from living mosquitoes. The International Convention for Aerial Navigation has laid down certain regulations regarding disinsection and for their being carried out the sanitary authorities of the countries traversed are responsible and their ideas as to the performance may and probably will vary further forced landings may occur at places where there is no sanitary organization and infected mosquitoes could enter there. A method of disinfection in flight offers the solution of the difficulty and a test was made in the presence of experts from the London School of Hygiene and Tropical Medicine the Air Ministry, the Colonial Office, the Ross Institute and others with officials of the Imperial Airways. The apparatus is devised by Dr Park Ross deputy chief health officer for the Union of South Africa and Mr LARJUTH of the South African Fumigation Company. Jets of insecticide spray are propelled by the pressure of an ordinary CO₂ sparklet bulb or by a phantomyst nebulizer using Deslito—an aqueous base extract of pyrethrum—which is non inflammable non-staining non-corrosive and not objectionable to passengers.

In the actual test in an aeroplane over the Solent twelve boxes of mosquitoes were distributed in various parts of the craft. The phantomyst apparatus was started in the rear cabin and after 10 minutes was moved forward to the next and so in succession. Of six hundred mosquitoes liberated all but one or two were killed by 15 minutes' exposure or even less.

H H S

MACKIE (F P) & CRABTREE (H S) The Destruction of Mosquitoes in Aircraft.—*Lancet* 1938 Aug 20 pp. 447-450 With 3 figs.

A valuable account of a method of disinfection of aircraft whilst in flight, a method which would do away with the practical difficulties of providing sanitary or insect free aerodromes under different local authorities apart from the fact that a large number of small refuelling stations are springing up in undeveloped country where there is no ground organization capable of efficient disinfection.

The choice of an insecticide presented certain difficulties as it was essential that it should have no effect on the passengers or crew and in view of the risk of fire, any substances with a paraffin-base had to be avoided. The most satisfactory of the samples tested was found to be Messrs Stafford Allen's "Deskito" a watery base pyrethrum insecticide, which was distributed through the interior of the aircraft by spray apparatus. The latter was of two types a disseminator specially designed to distribute dry insecticide in the passenger cabins, and an Ejector suitable for luggage holds, bedding lockers and all other parts of the aircraft.

The phantomyst nebuliser made by Messrs. Andre (Components) Ltd., was used for the passenger cabins and Larmuth's device driven by the pressure of CO₂ in a sparklet bulb for the ejector type.

The results of various experiments carried out for Imperial Airways, Ltd. show the efficiency of this method, and although in some instances the action of the pyrethrum was delayed all the insects exposed to its action eventually succumbed.

Further experiments are necessary in order to perfect the method, which is doubtless that of the future for cabin type aircraft.

E H

SALEUN (G) CECCALDI (J) & PALINACCI (A.) Isolement de la première souche de virus amaril au Congo (Afrique Equatoriale Française) [The Isolation of the First Strain of Yellow Fever in the (French) Congo (French Equatorial Africa).]—*Bull Soc. Path. Exot* 1938. May 11 Vol 31 No. 5 pp. 418-429

An isolated case of yellow fever occurred at Brazzaville and from the blood of this patient on the fourth day of the disease the authors infected mice by intracerebral inoculation. The resulting strain of virus labelled "S.C." has been passaged for several generations in the brains of mice and by means of cross immunity tests has been shown to be indistinguishable from the Dakar strain of yellow fever. In addition to mice, the authors also succeeded in adapting the virus to guinea-pigs by intracerebral inoculation of the patient's blood.

The autopsy on the patient also confirmed the diagnosis, since typical pathological changes were observed, and on histological examination of the tissues (by M. BARLET) typical fatty degeneration and intranuclear bodies were found. The sera of seven persons who

had been in direct contact with the patient were examined for yellow fever immune bodies with negative results
 This is the first strain of yellow fever to be isolated in French Equatorial Africa and furnishes conclusive evidence of the existence of the disease in that region
 E H

DE ASSUMPTÃO (Lucas) Prova de protecção intracerebral em camondongo com o virus isolado em São Paulo de um caso de febre amarela silvestre [The Intracerebral Protection Test with Jungle Yellow Fever Virus Isolated in São Paulo]—*Ann Paulista Med e Cirurg* 1938. Apr Vol. 35 No 4 pp 351-363
 With 14 figs English summary

The author carried out protection tests using the camondongo (Brazilian house rat) and a strain of jungle yellow fever virus isolated in São Paulo in the last outbreak there and compared the results with those of a Dakar neurotropic strain. Serum dilutions ranged from 1 in 100 to 1 in 100 000 and each series of tests was made on seven groups of five animals. All the control animals died with the neurotropic strain and all except one (in the highest dilution of serum) with the São Paulo strain. With the immune serum the results were not quite parallel. The Dakar virus had a shorter incubation some of the animals began to show symptoms on the third day and were definitely ill by the fourth with dilution of 1 in 100 longer in higher dilutions but death occurred after a couple of days illness. With the São Paulo virus and death did not take place till three or four days later. It may be that the differences—the São Paulo virus being apparently somewhat weaker—are ascribable to the fact that the strain had reached its fifteenth transfer. The essential identity however is proved by these immunity tests.
 H H S

DE ASSUMPTÃO (Lucas) Prova de protecção intracerebral em camondongo com o virus isolado em São Paulo de um caso de febre amarela silvestre [Evidence of Intracerebral Protection in the Brazilian House Rat Virus Isolated from a Case of Jungle Yellow Fever in São Paulo]—*Bol Inst Hyg de São Paulo* No 62 22 pp English summary

HELMINTHIASIS.

PRECIS OF ABSTRACTS IN THIS SECTION

BASNUEVO and AMIDO (p 35) describe a method of preserving helminth eggs. HOEPLI FENG and CHU (p. 35) show that adults and larval stages of helminths can be kept alive in various artificial media for considerable periods. No development took place under these experimental conditions.

The prevalence of helminthic infections in Italy and Japan is noted by GIULIO (p 35) and YUKUTO and Co (p. 36). The former examined water, soil and house dirt for ova with positive results.

SCOTT and BARLOW (p 36) found that hookworm, ascariis and schistosome infection in Egyptian peasants after treatment and in some instances after the construction of bore-hole latrines, was as prevalent within 3 years of that treatment as it had been before regardless of the presence or absence of the latrines. As these infections except ascariis, are acquired under field conditions it could hardly be expected that house sanitation could influence them. Sanitation should, however, be extended in the hope that with education the natives can be persuaded to use latrines in the fields. Other methods of control, and medicinal treatment, should be fully used.

Schistosomiasis is reported for the first time in Libya by CICCHITTO (p. 37). TANG (p 37) describes the morphological features of *S. japonicum*. PERDOMO HURTADO *et al* (p 37) attribute infection with *S. mansoni* to working in river sand. WILLIAMS (p 38) reports a case of schistosomiasis in Szechwan (China). Eggs were found in the appendix but not in the stools. The first case from Kwangsi is reported by YAO (p 38).

GORSILL (p 38) reports that the level of Lake Nyasa has been rising for some years, and the fertile and thickly populated land of the lake shore is becoming a swamp. *Limnusa laurenti* and *Physopsis africana* are found there and cercariae of *S. mansoni* have been observed penetrating the former and of *S. haematobium* the latter. Ova of both are frequently found in the Natives. Intravenous antimony tartrate is the best treatment. CAWSTON (p 38) notes the important mollusc hosts in Mozambique. KLENERMAN (p 38) records a family presumed to have been infected with schistosomes after bathing in a river in Natal. MARTINS and VERSIANI (p 39) found an infected *Australorbis glabratus* in a lake in Bello Horizonte (Brazil).

MAINIER (p 39) shows that in all kinds of infections with *S. haematobium* and *S. mansoni* X-ray examination constantly reveals pulmonary involvement. Asthma may result from infection but is an allergic phenomenon not related to the pulmonary lesions. It depends upon the constitutional tendency of the patient and his response to the substances liberated by the schistosomes.

CAMPBELL (p 40) suggests that a large proportion of oriental cases of splenomegaly are due to schistosomiasis. Ova may sometimes be found by duodenal sound though absent in the faeces. If operation for splenectomy is contemplated, the first step should be the excision and examination, by the frozen section method, of a portion of liver tissue. If schistosome ova are found in the liver splenectomy should not be performed. BUCKLEY (p 40) describes a swamp itch in Malay due to cercariae of *S. spindale*.

RODRÍGUEZ MOLINA and HOFFMAN (p 40) describe two cases of infection with *Fasciola hepatica*. Emetine treatment was useful. OHABE (p 40) shows that *Leucogobia gracilis* is an intermediate fish host of *Clonorchis sinensis*. OTTO (p 41) describes the blood changes and serum reactions in infections with *Cl sinensis*. VAZQUEZ-COLET and AFRICA (p 42) detail the fish hosts of two heterophyids found in man.

C W

BASNUEVO (José G) & AVIDO (Vicente). Manera de conservar huevos de helmintos [The Preservation of Helminth Eggs].—*Rev Med Trop y Parasit* Habana. 1938 May-June. Vol. 4 No 3 pp 159-160

If faeces are liquid or mushy add to 100 grammes 25 cc of a mixture made up of formol 15 glycerine 20 water 100 if they are not mix them first with 25 cc. of distilled water. If eggs are few faeces [presumably 100 gm] are diluted with 100 cc of water and put through a fine sieve. The filtrate is strongly centrifuged the supernatant fluid poured off and to the precipitate is added the fluid noted above.

Clayton Lane

HOEPLI (R.) FENG (L. C) & CHU (H. J.) Attempts to culture Helminths of Vertebrates in Artificial Media.—*Chinese Med J* 1938 Mar Supp No 2 pp 343-374 [88 refs]

Adults and larval stages of parasitic helminths were kept alive in artificial media for a considerable period no development took place in any case.

Adult *Clonorchis sinensis* did best in serum with an equal quantity of Tyrode solution and also in undiluted heparinized rabbit plasma surviving at 37°C. as long as five months when there was weekly change of medium when there was no such change the maximum was 65 days in a solution of prontosil, 1 in 8,000 in diluted horse serum. Adult *Schistosoma japonicum* at 37°C lived in horse serum pure or diluted with an equal amount of Tyrode solution changed once or twice weekly for over 5 months weak prontosil or mercurochrome-220 killing them within a few days. Larvae of *Ascaris suum* hatched by feeding mature eggs to guineapigs lived 2 or 3 days in horse or rabbit serum in normal saline with saline extract of guineapigs liver or in living cultures of chicken fibroblasts. *Microfilaria immitis* lived up to 11 days without growth or development and without absorption by white corpuscles. The metacercaria of *Clonorchis sinensis* lived in different media up to 2 weeks emptying the excretory bladder at various intervals but undergoing no development. Other animal parasites were also used and the work of other persons is noted.

C L.

GIULIO (Buonommi). Diffusione dell'elmintiasi in alcuni centri della Campania. [The Prevalence of Helminth Infections in Some Centres in the Campagna].—Reprinted from *Boll. d Soc Ital. di Biol Sperim* 1938 Vol. 13 3 pp.

The results of examination of faecal smears of 430 persons nearly all under 15 are ascaris 337 trichuris 167 enterobius 7 *Hymenolepis nana* 22. Examination was for 5 to 10 minutes repeated once or

twice if it was [? completely] negative. Comparison is made with other countries without reference to the technique of examination used in them. Of 4 water receptacles examined there were ascaris eggs in two of 4 samples of garden soil all had eggs of ascaris and trichuria, and two those of enterobius of six scrapings of dirt from the floors of houses ascaris and trichuria eggs were present in five and enterobius eggs in one

C L

Yumoto (Yoshika) & Co (Chiden) The Incidence of Intestinal Parasites in Ishigaki Island, Okinawa Province Japan.—*Taiwan Jgakkai Zasshi (Jl Med Assoc Formosa)* 1938. Aug Vol. 37 No. 8 (401) [In Japanese pp 1267-1274 [15 refs.] English summary p 1274]

The stools examined, each by six smears numbered 1-6 of the smears five were dilutions in normal saline and one in Donaldson's iodine solution. The percentages reported were no parasites 10.05 hookworm 34.92 ascaris 8.73 trichuris 2.38, enterobius 3.17 strongyloides 22.22, *H. nana* 3.17 taenia 0.79 *E. histolytica* 7.94 *E. coli* 12.69 *E. nana* 8.35 giardia 14.29

C L

YOUNG (May R.) Helminth Parasites of New Zealand. A Bibliography with Alphabetical Lists of Authors, Hosts and Parasites.—19 pp 1938 Imperial Bureau of Agricultural Parasitology (Helminthology) Witches Farm, St Albans [4s]

SISON (Agencia B M) & TOLMATELO (Delfin G.) Hypochromic Anemia Secondary to Multiple Parasitism.—*Jl Philippine Islands Med Assoc* 1938 June Vol. 18 No. 6 pp 353-357 With 1 fig

SCOTT (J. Allen) & BARLOW (Claude H.) Limitations to the Control of Helminth Parasites in Egypt by Means of Treatment and Sanitation.—*Amer Jl Hyg* 1938. May Vol. 27 No. 3 pp 619-648. With 11 figs. [17 refs.]

"A study has been made of the changes during a period of 6 years in the level of infection with hookworms, ascaris, and the two species of schistosomes in Egyptian peasants living under varying conditions. The prevalence of the parasites and the average intensity of infections as indicated by egg counts have shown sharp fluctuations which cannot be correlated with known causes. Greater changes, always in the direction of reduction, have followed the administration of as much needed treatment as the people could be persuaded to take. Bored hole latrines were built in all of the houses of some of these villages, but whether or not they were present, the infections had in most cases returned, within 3 years, to their pre-treatment levels. Since these parasites, with the exception of ascaris are transmitted only under field conditions it could hardly be expected that house sanitation would affect them significantly. It is to be hoped that, after becoming accustomed to sanitation in their villages, the people can eventually be taught to accept and use latrines in the fields. Education may also be effective in reducing schistosome infections through teaching the avoidance of pollution of water. At the same time snail control through canal clearance and modifications in methods of irrigation, gives promise of success. Although sanitation has not been effective as a means of controlling worm parasites under these conditions, its general value should not be underestimated and its further extension to field conditions should be advocated. Furthermore, while the effects

of therapeutics have been shown to be only temporary treatment to alleviate the condition of the critically ill should not be abandoned
C L

CICCHITTO (Elio) I primi casi di schistosomiasi intestinale da Schistosoma Mansonii in Libia. [The First Cases In Libya of Intestinal Infection by *S. mansonii*].—*Policlinico Sez. Prat.* 1938. May 30 Vol 45 No 22. pp 1049-50 1053-4 1057 [13 refs.]

Two men are reported upon who had not been outside Libya. In one schistosome ova both lateral spined and terminal spined were found in the faeces after many examinations. In the second repeated examinations disclosed both kinds in the urine
C L

D'AMICO (Mario) Bilharziosi intestinale in due indigeni residenti a Massaua e provenienti da Saganeiti [Intestinal Schistosomiasis in Two Natives of Saganeiti in Massawa].—*Rass Sanitaria d'Impero* Addis Ababa, 1933 Jan-Feb Vol. 1 No 4-5 pp 57-58.

BRALERO (G. D.) Schistosomes and Schistosomiasis in India.—*Indian J. Vet. Sci. & Animal Husbandry* 1933. June Vol. 8. Pt. 2. pp 149-157 [53 refs.]

TANG (C. C.) Some Remarks on the Morphology of the Miracidium and Cercaria of *Schistosoma japonicum*.—*Chinese Med. J.* 1933. Mar Supp No 2. pp 423-432. With 12 figs on 4 plates. [17 refs.]

A confirmation of observations by other workers with some new ones the investigation being made possible at the Peiping Union Medical College by a Fellowship granted by the Rockefeller Foundation. It is reported that caudal to the nerve centre the body consists of caudad flame cells. In all of a large number of eggs observed during hatching the split in the shell was longitudinal, and if the vitelline membrane does not also split by osmotic pressure the enclosed miracidium dies. As in the case of *S. haematobium* and *S. mansonii* there are in the cercaria five pairs of cephalic glands the two cephalad pairs oxyphilic and the three caudad pairs basophilic, but in *S. japonicum* the granules in the former are not distinctly coarser than in the latter otherwise they conform to the characteristics reported for cercariae of the other two schistosomes of man
C L.

KAU (L. S.) & WU (Kuang) A Note on the Pathology of Schistosomiasis due to *S. japonicum* among Cattle in China.—*Ann. Trop. Med. & Parasit.* 1933 Aug 2. Vol. 32. No 2. pp 129-132. With 2 figs. on 1 plate

PERDOMO HURTADO (B) RUIZ RODRIGUEZ (J. M.) & ANIBAL OSUNA. Un caso de cirrosis hipertrofica de origen bilharziano [A Case of Hypertrophic Bilharzial Cirrhosis].—*Gac. Med. de Caracas* 1933. Mar 15 Vol. 45 No 5 pp 67-69

An intestinal infection by *Schistosoma mansonii* at Caracas Venezuela established by faecal examination was evidently acquired during collection of river sand for at that time itching appeared over the whole body
C L.

WILLIAMS (T H) Human Schistosoma Infestation in Szechwan. A Case Report.—*Chinese Med Jl* 1938 Aug Vol. 54 No 2 pp 159-161 With 1 fig

An autochthonous case of schistosome infection is reported from an area of the Szechwan province not hitherto reported as an endemic zone. Eggs were present in an appendix which seems to have been excised for epigastric and general abdominal discomfort "with later symptoms of peptic ulcer". Though the stool was then examined many times and cultured once no ova or miracidia were seen. *Oncomelania* snails were found in the area in question. C L.

YAO (A T) Schistosomiasis in Kwangsi.—*Chinese Med Jl* 1938 Aug Vol. 54 No 2 p 162.

A first record of the infection in the Pin yang district C L.

GOSALL (N L) Some Observations on Schistosomiasis in North Nyasa District.—*Nyasaland Protectorate Ann Med & San. Rep* for Year ending 31st December 1937 Appendix III pp 85-98.

The most thickly inhabited and most fertile parts of the North Nyasa District are the flat lands on the lake shore. For a number of years the level of the lake has been rising and this land has become a swamp harbouring *Limnaea laurentis* and *Physopsis africana* but no *Planorbis* has been found. Cercariae of *S. mansoni* have been watched penetrating the former and those of *S. haematobium* the latter. Ova of *S. mansoni* have been found in 163 of 204 stools and of *S. haematobium* in 79 of 204 urines. Few of those with the latter infection complain of it. Antimony tartrate intravenously has proved more effective than any of the more modern remedies and in 100 patients after antimony treatment the percentage of haemoglobin rose from 65 to 75 though 63 per cent. of those who had also hookworm infection were still suffering from this. C L.

CAWSTON (F Gordon) Molluscs which serve as Hosts for Schistosomes in Mozambique.—*Jl Trop Med & Hyg* 1938 June 1 Vol. 41 No 11 pp 181-182

Of the 150 non marine shells from Portuguese East Africa Major M CONNOLLY has noted 43 aquatic species and, apart from *Cleopatra* and *Melanoides tuberculatus* which if implicated are rare hosts the molluscs important for the spread of schistosomiasis are *Physopsis africana*, *Ph. globosa*, *Planorbis pfeifferi* and *Bulinus forskali*.

C L.

- i. KLEMMERMAN (Pauline) Three Interesting Cases of Bilharzial Infection in a Family.—*South African Med Jl* 1938 May 28 Vol. 12 No 10 pp 361-362.
- ii. CAWSTON (F G) Undiagnosed Infection in a Family [Correspondence]—*Ibid* June 11 No. 11 p. 413.

i. After river bathing a father mother and son had high fever with no malaria parasites or Widal reaction in the blood, no helminthic eggs in urine or faeces at any time no reaction for *Br. malitensis* or *Br. abortus*. The motions became blood tinged. The child showed

an eosinophilia of 12 per cent. and at one time his penis swelled, apparently simulating giant urticaria. With foudin recovery followed in all.

u. Cawston points out that the diagnosis of schistosomiasis was premature and that there was no warrant for official action warning against river bathing because a family was rumoured to have contracted this infection by so doing

Cawston (F Gordon) Favourite Sites of Schistosomes and a Consideration of their Destruction in Stock.—*J Trop Med & Hyg* 1933 Sept. 15 Vol. 41 No. 18 pp 293-294 C L.

Anderson (Ch) Contribution à l'étude de la bilharziose dans la région des Matmata. (Prospection de l'Oued Djer) (On Bilharziasis in Matmata. Inspection of the Wadi Djer)—*Bull Soc Path Exot* 1933 June 8 Vol. 31 No 6 pp 498-502

In Southern Tunisia *Bulinus contortus* has been found in unobvious places such as under culverts. The note is of local importance

Martins (A. Vianna) & Versiani (Waldemar) Schistosomose mansoni em Bello Horizonte [S. mansoni in Bello Horizonte].—*Brasil-Medico* 1933 May 14 Vol. 52. No 20 pp 471-472. English summary (10 lines) C L.

By means of a barrage a lake has been formed in the Prefecture of Bello Horizonte to insure abundant supply of water to the city in future. At its margin were collected 42 examples of *Australorbis glabratus* of which one emitted cercariae identified as those of *S. mansoni*. Steps have been taken to clean up the lake and bathing in it has been forbidden.

Mainzer (Fritz) Bilharzial Asthma. Bronchial Asthma in Schistosoma Infection.—*Trans Roy Soc Trop Med & Hyg* 1933. Aug 25 Vol. 32. No 2. pp 253-264 With 3 figs on 2 plates. C L.

Three cases of bilharzial asthma are described as a type of allergic reaction dependent on constitutional factors and substances liberated by *Schistosoma* (*haematobium* or *mansoni*). One of these cases showed febrile asthma with simultaneous urticarial rash.

"The two other observations concerned blood relations (uncle and nephew). It was possible to prove that the asthmatic paroxysms had no relation to lesions of the lungs brought about by the parasite the pulmonary bilharziasis. In all kinds of infections with *S. haematobium* and *mansoni* X ray examination constantly reveals pulmonary involvement. The causal relationship between bilharzia infection and asthma is demonstrated by the complete parallelism in the course of both diseases subsequent to specific therapy.

The allergic nature of this kind of asthma has been proved by its association with urticaria and the constitutional and hereditary character of this allergy which is very infrequently encountered, by its occurrence in relatives.

"The resistance of the atypical bilharziasis of the liver and lungs to foudin treatment is noted.

C L.

CAMPBELL (Horace Emerson) Schistosomiasis and Banti's Disease. An Inquiry into their Possible Relationship.—*Chinese Med J* 1938. May. Vol. 53. No. 5. pp. 459-466. [36 refs.]

As a working hypothesis then I suggest schistosoma as the etiology in a large proportion of these Oriental cases of splenomegaly of unknown origin, variously known as splenic anaemia, Banti's disease, cryptogenetic splenomegaly etc."

Campbell notes how cases of this kind have been reported from Peiping, Swatow and Formosa but that no known cases of schistosomiasis have been reported from the first or last of these places. He reviews experience in China including his own [this *Bulletin* 1937 Vol. 34 p. 389] in Egypt and in Italy by GREPI [this *Bulletin* 1937 Vol. 34 p. 387] and points out that ova may not be found in stools in schistosome infection and yet may be got by duodenal sound, and that they cannot of course be found when infection is by male parasites alone. Repeated intensive study may be needed to disclose ova, liver biopsy with immediate sectioning of frozen tissue being undertaken as a first step in a splenectomy, this last not being proceeded with if eggs are so found.

C. L.

BUCKLEY (J. J. C.) On a Dermatitis in Malays caused by the Cercariae of *Schistosoma spindale* Montgomery 1906.—*Jl Helminthology* 1938. May. Vol. 16. No. 2. pp. 117-120.

A swamp itch has been attributed by Malays to paddy cultivation in waters which contain snails. These snails were identified as *Planorbis eximius* and a *Limnaea* species. From these emerged an echinostome cercaria, one with an oral stylet and a furcocercous cercaria. The two first produced no itching when put on the forearm, the last did and developed in mice into *S. spindale*. Probably the local optimum definitive host is the Indian water buffalo which is used in cultivation. The Malays have found that the wearing of boots and puttees may prevent the itch.

C. L.

RODRIGUEZ MOLINA (Rafael) & HOFFMAN (William A.) The Coincidence of *Schistosoma mansoni* and *Fasciola hepatica*.—*Rev. Med. Trop. y Parasit.* Habana. 1938. May-June. Vol. 4. No. 3. pp. 133-140.

In these two cases the schistosome infection had apparently been controlled before the fasciola infection was acquired, the latter seems to have been got by chewing grass in one instance and eating watercress in the other picked from the areas polluted by cattle. In one the symptoms were suggestive of gallstones and in the other of duodenal ulcer. After emetine all symptoms disappeared in the first and fasciola eggs could not be found in the faeces, while in the second the symptoms greatly improved but fasciola eggs did not disappear.

C. L.

OKAZAKI (Koyo) On the Second Intermediate Hosts of *Clonorchis sinensis* (Cobbold) in Fukuoka Prefecture.—*Fukuoka Acta Med.* (Fukuoka-Ikkadaigaku-Zasshi) 1938. July. Vol. 31. No. 7. [In Japanese pp. 1217-1229. [29 refs.] English summary pp. 140-144.]

The paper contains the names of 43 fish which have been reported as second intermediate hosts of *Clonorchis sinensis* together with those

of the authors responsible for placing them on the list and the countries in which the observations were made Okabe's present addition is *Leucogobia gracilis* C. L.

OTTO (J H F) TSCHAN (Tsching Ji) & AU (Lifu) Weitere Beobachtungen und Erfahrungen in Canton tierische Schmarotzer der menschlichen Verdauungsorgane betreffend. [Further Observations on Parasites of the Digestive Organs of Man in Canton.]—Reprinted from *Tung-Chi Med Monatsschrift* 1938, No 6 17 pp [25 refs]

The report is on 978 patients whose stools were examined by the Telemann technique. Of them the percentages shown to be infected were in all 48-6 (over 100 patients with more than one kind of parasite) with *Opisthorchis* [*Clonorchis*] *sinensis* 40.5 in men and 34.5 in women after one examination. Urobilinogen was present in 17.1 of opisthorchis cases, fasting blood sugar was not affected by any parasite. In fasting blood eosinophilia was higher by 5 per cent in those with *clonorchis* than in those with any other infection or with no infection. *Clonorchis* infection seems to increase reflex irritability and in the graduated Takata reaction mentioned by MAWCKE gave more precipitate in the sera and increased when there was a diagnosis of gastric and duodenal ulcer C. L.

HSD (H F) & KILAN (O K) Studies on Certain Problems of *Clonorchis sinensis* III. On the Morphology of the Metacercaria.—Reprinted from *Festschrift Bernhard Nocht* z 80 Geburtstag von seinen Freunden u Schülern Hamburg 1937 pp 216-220 With 1 fig

The metacercaria of *Clonorchis sinensis* is clearly pictured and a table shows the differences between it and the metacercaria of *Opisthorchis felinus* C. L.

CUU (H J) Certain Behavior Reactions of *Schistosoma japonicum* in *Clonorchis sinensis* in vitro.—*Chinese Med J* 1938 Mar Suppl No 2, pp 411-417 With 1 fig

FREUND (Ludwig) Die Einschleppungsmöglichkeit der Haemoptoc parasitaria nach Mitteleuropa. [The Possibility of the Importation of Parasitic Haemoptysis into Mid-Europe.]—*Med Klin* 1938, June 24 Vol. 34 No 25 (1748) pp 831-832.

The possibility that the parasite of haemoptysis may gain a footing in middle Europe is considered. The likelihood that *Paragonimus westermani* may gain this footing remains an interesting theoretical problem which one may hope will never have a practical significance but it gives to European medical men an insight into the pathology of man's parasites. [Readers should not accept either generic or specific names as correct in the varying forms in which they appear] C. I.

infiltration about hair follicles and small blood vessels. The lesions of yaws subside rapidly, while those of syphilis become indurated by new formation of fibrous tissue.

The distribution of the spirochaetes in hair follicles and epidermis is essentially the same in comparable lesions of the two diseases.

In the larger lesions of syphilis necrosis and an exudation of polymorphonuclear leukocytes are prominent, and spirochetes are numerous. In the lesions of yaws there are few spirochetes and they disappear rapidly.

There is no evidence of phagocytosis of spirochetes by any type of cell in either yaws or syphilis.
H S S

TAKAHASI (H) Beiträge zur histopathologischen Untersuchung der experimentellen Syphilis und Frambösie bei Kaninchen. I. Mitteilung Pathologische Veränderungen der Aortenwand. Contributions to the Histopathological Investigation of Experimental Syphilis and Yaws. 1st Communication Pathological Changes of the Aorta.—*Japanese Jl. Experim Med* 1937 Oct. 20. Vol. 15. No. 5. pp. 321-327. [Summary appears also in *Bulletin of Hygiene*.]

For a number of years Takahasi has been examining the aortas of rabbits infected respectively with 8 strains of *Sp. pallida* with 4 strains of *Sp. pertensis* and with the spirochaetes of rat-bite fever. The aortas were examined histologically after staining for tissue changes and for bacterial (including spirochaetal) content and were tested culturally as well as by inoculation into the scrotum of other rabbits. Of 168 rabbits infected with syphilis the number with aortic changes was 29 but in 34 normal rabbits 13 infected with yaws and 3 with rat-bite fever no such changes were found. Of 78 syphilitic rabbits examined less than 100 days after infection only 5 showed aortic changes the remaining 24 occurring in 80 rabbits with older infections. No difference between the strains was found in respect of frequency with which they infected the aorta. The changes were in two main forms sometimes combined in one specimen, namely with necrotic changes in the media and with inflammatory changes of the media and adventitia. The two forms of which the first was by far the commonest, are described in detail. Aneurysms were found in 12 of the 29 rabbits. They were in all stages, so that the author is able to confirm that the changes in the media play the chief rôle in the development of aneurysm. No spirochaetes or other bacteria were found in the sections but by inoculation experiments *Sp. pallida* was found in two cases of mesoaortitis.
L. B. Harrison.

TAKAHASI (H) Beiträge zur histopathologischen Untersuchung der experimentellen Syphilis und Frambösie bei Kaninchen. II. Mitteilung Orchitis und Initialklerose der Rückenhaut sowie des Hodensacks. [Contributions to Histopathological Investigations of Experimental Syphilis and Framboesia in Rabbits. Second Communication. Orchitis and Primary Sclerosis of the Skin of the Back and the Scrotum].—*Japanese Jl. Experim Med* 1937 Dec. 20. Vol. 15. No. 6. pp. 401-406. With 4 figs. on 2 plates. [13 refs.] [Summary appears also in *Bulletin of Hygiene*.]

Takahasi refers first to the work of numerous authors who have tried to settle the problem of the identity or otherwise of syphilis

and jaws by histological examination and criticizes it on the ground of the authors having concentrated too narrowly on the tissue changes and paid too little attention to the biological peculiarities of the micro-organisms. His researches have aimed to fill this gap and he claims to demonstrate a strong difference between the two diseases in respect of distribution of spirochaetes in the testes and skin of rabbits after experimental inoculation. The spirochaetes used in the research were three laboratory strains of *Sp. pallida* and four of *Sp. pertenues*. The rabbits studied in the investigation were inoculated with emulsions obtained from the testes of rabbits which had reached the acme of the syphilitic or framboesial orchitis according to the case following inoculation with the respective organisms. The emulsion was of a strength of 3 to 5 organisms per field. The inoculations were into the testes and the skin of the back and the scrotum.

In the tunica albuginea and tunica vasculosa of the testes inoculated with *Sp. pallida* the usual result was a diffuse cellular infiltration and mucoid degeneration which contrasted with the circumscribed infiltration and degeneration found after inoculation with *Sp. pertenues* but often in the syphilitic testes the infiltrations were circumscribed making a differentiation on the score of histological changes in the tissues difficult. The differentiation was however quite easy when the distribution of the spirochaetes was considered. In the syphilitic testes *Sp. pallida* was spread widely throughout the cell infiltrates and especially so in the vessel walls and connective tissue fibres of the organism was congregated in heaps. In the interstitial tissue of the syphilitic testes there was widespread mucoid degeneration or necrotic change often leading to great increase of connective tissue. In the framboesial testes there was no mucoid degeneration or necrotic nodules formed of circumscribed infiltrates of round cells and the connective tissue was only slightly increased. At the same time some syphilitic testes showed changes that were difficult to distinguish from those seen in the framboesial but again the distribution of the spirochaetes in the same way as in the tunicae made the differentiation easy. The blood vessels both veins and arteries of the testes inoculated with *Sp. pallida* showed innumerable spirochaetes in their walls while in the framboesial testes such appearances were rare and only slight immediately adjoining corium as well as the increase of the epithelial and vessels of the corium were necrosed and the changes in the very marked, while in the yaws-infected skins the changes were chiefly in the epidermis though again the tissue changes were chiefly widely through the deeper tissues especially in the corium and connective tissue fibres vessel walls and nerves of the subcutaneous tissues. *Sp. pertenues* on the contrary was seen only seldom in the corium and not at all in the subcutaneous tissues but abundantly in the epidermis the prickly cell layer and the outer hair sheath. This distribution of *Sp. pertenues* in the rabbit's skin accords with that found by SCHÜFFNER, SIEBERT, HALLENBERGER and others in the skin of human beings suffering from yaws. The induration of the primary lesion was proportional to the increase of the reticular tissue and the mucoid degeneration of the corium, being therefore much more marked in the syphilitic chancres than in the primary yaws.

The article is illustrated with four photomicrographs two of the testes in yaws and syphilis respectively and two of the skin in yaws, to demonstrate the differences in the distribution of the two varieties of spirochaetes.

L. W. Harrison

JOLLY (A.) & DI RUGGIERO A propos d'un cas de gangosa observé en Guadeloupe [Gangosa seen in Guadeloupe].—*Bull Soc Path Exot.* 1937 Oct 13 Vol. 30 No. 8. pp. 706-712. With 1 fig.

The designation rhinopharyngitis mutilans or gangosa has been used by various authors for a number of conditions of varying aetiology including yaws syphilis leishmaniasis blastomycosis, *Tucumania* etc.

The case now described, the first the authors believe to have been observed in the Antilles occurred in the person of a 39-year-old male native of Guadeloupe who came from a yaws area but who had no history or sign of infection with yaws. There was ulceration of both nostrils with destruction of the columna and septum but no perforation of the palate. There was also noted a number of nodules the size of a pea in the skin of the lobules of the nose which on pressure yielded a drop of pus. Smears made from the several lesions revealed yeast-like elements resembling Breinl's *Cryptococcus mutilans* but no spirochaete, leishmania nor acid fast bacilli. Culture and animal inoculation were negative. Pathological examination of a biopsy specimen showed a granulomatous change of doubtful syphilitic origin. The Mennicke reaction of blood serum was strongly positive and the ulceration healed completely in three weeks with treatment by acetylsan.

The authors believe the disease in this case to have been due to the cryptococcus and not to have been a manifestation of yaws or syphilis with a secondary infection. (This opinion will probably not be shared by many of those who read the article. It should be noted also that this is by no means the first case of gangosa to be reported from the West Indies.)

H S S

HELENFELDT (G.) Ueber einen Fall von Goundon. [A Case of Goundon].—*Arch f Schiffs- u Trop Hyg.* 1938. Feb Vol 42. No 2. pp. 74-75.

The case record of a 54-year-old man who exhibited small symmetrical paranasal swellings. These were oval in shape the one 2.3 x 5 cm. the other 2.0 x 1.4 cm. and due as radiological examination showed to hyperostosis of the nasal processes of the maxillae. They had not been noticed by the patient or his relations and were so small that they could not be demonstrated by photograph. The nasal mucous membrane was normal the skin moved freely over the swellings there was no pain. Though the man had been in German S W Africa in 1904 for eight months there was no history of yaws or syphilis or indeed of any tropical infection. He had had in 1911 a resection of nasal septum done for some condition which had been called asthma.

[It seems a pity to label this a case of goundon, since that term has been used to denote some more specific lesion. Goundon-like swellings may occur in a number of osseous affections as in Paget's disease osteitis fibrosa and leontiasis ossea.]

H S S.

SALAH (AI) *Juxta-Articular Nodes. Report of the First Case in Egypt.*
—*Jl Egyptian Med Assoc* 1938 May Vol 21 No 5 pp 288-301 With 7 figs. [40 refs.]
A case of J.A.N. in a native of Egypt considered to be the first recorded from that country Syphilis in the absence of yaws believed to be the cause W.R. and Kahn test positive
H S S

CAROL (W. L. L.) & PRAKKEN (J. R.) *Eenige gevallen van nodositas juxta-articularis.* [Cases of Juxta articular Nodules.]—*Nederl Tydschr v Geneesk* 1938 July 2 Vol 82, No 27 pp 3315-3322. With 5 figs on 2 plates [44 refs. English summary]

ERNANDO (Antonio S.) & DE OGAMPO (Geminiano) *Wassermann Reaction of the Cerebrospinal Fluid in the Diagnosis of Yaws of the Nose and Throat.*—*Jl Philippine Islands Med Assoc* 1938 June Vol. 18, No 6 pp 347-352

the cerebrospinal fluids from 26 cases of tertiary yaws exhibiting lesions of throat and nose were examined. All showed a negative W.R. and normal cellular and biochemical contents. The cases were chosen carefully to exclude syphilis and tuberculosis.
H S S

DE HAAS *Periostitis framboetica infantilis* (Periostitis in an Infant with Yaws.)—*Geneesk Tydschr v Nederl Indië* 1938, Sept 13 Vol. 78, No 37 pp 2281-2282. With 2 figs. on 1 plate.

The subject was a child of 18 months who had been ailing for a month during the first ten days of which there had been fever. A framboeal rash was present which yielded to sulpharsenol and bismuth in 2½ weeks.
X rays showed a periostitis along the radius and ulna and the tibia and fibula and some callus at the lower end of the right fibula. Though the difficulty of differentiating yaws from congenital syphilis is well known the author regards the basic condition in the present case as yaws because the W.R. was positive in the child but negative in the mother
H H S

HECKENROTH (Marcel) [Médecin des Troupes coloniales Ancien Préparateur de Médecine exotique, Diplôme de Médecine coloniale] *Les arséno-résistances et les arséno-réduces au cours du traitement du pian.* [The Treatment of Yaws with Arsenicals Resistance and Relapse.] [Thesis.]—132 pp [Bibliography] 1937 Bordeaux Imprimerie Librairie Delmas 6 Place Saint Christoly

Like many theses presented for the M.D. of French Universities this Bordeaux thesis by Dr Marcel Heckenroth is merely a discussion upon the subject on the title page without any new facts being presented.
Another common failing and one noticeable in this paper is an attempt at over-elaboration and lack of precision in conclusions. The first part of the book is devoted to a discussion of so-called arsenic-resistance in syphilis and trypanosomiasis. The work of
(1937)

Warrington YORKE and his colleagues really forms the basis of our knowledge on this subject and nothing of value is added. In the second chapter the well known fact that quite a fair proportion of cases of yaws relapse after short courses of treatment is dealt with and referred to as arsenical relapse (*arséno-récidives*) followed by the citation of some few cases from other observers in which it is argued arsenic-resistance was exhibited. It is further suggested on clinical grounds that arsenic resistance may be broken by resort to bismuth or some other drug. It is further believed on clinical reports of two native cases that arsenic-resistance is transmitted by the parasite of yaws (but nothing is proved).
H S S

GÄLINDER (Ernst J.) *Pyoktanin in der Behandlung der tertiären Frambœsiengeschwüre.* [Pyoktanin in the Treatment of Tertiary Lesions of Yaws.]—*Arch. f. Schiffss- u. Trop. Hyg.* 1938, Jan. Vol. 42, No 1 pp. 23-25

Writing from the Mission Hospital Agogo Gold Coast the author finds Pyoktanin coeruleum Merck in 1 per cent. solution a very useful remedy in treating the tertiary lesions of yaws.
H S S

SPRUE

PRÉCIS OF ABSTRACTS IN THIS SECTION

SALAH (p 54) records a patient (believed to be the first case of sprue in an Egyptian) successfully treated, on the lines laid down by FAIRLEY by dieting and the administration of liver and HCl. STALDER (p 54) describes two patients suffering from non tropical sprue the first treated successfully with Campolon the second failing to respond either to Campolon or Cortin. He considers that a secondary B₁₂ avitaminosis is concerned in this condition. ROHR (p 55) finds that in non tropical sprue the calcium content of the stool is high not because absorption powers are deficient but because calcium combines with the unabsorbed fatty acids to form relatively insoluble soaps. The three co-acting factors in non tropical sprue are gastro-intestinal disorder deficiency of vitamin, or iron calcium and Castle's factor and endocrine disturbance of which the first is the most important. VAN LEEUWEN (p 56) also stresses the importance of gastro-intestinal disorders and endocrine disturbance. BARKER and RHOADS (p 57) as a result of investigations on cases of sprue conclude that malabsorption of fat is the cause of the diarrhoea rather than *vice versa*. HOPMAN (p 58) explains tropical sprue as one of a series of results which follow defective adjustment to the metabolic requirements of hot climates. This series includes obesity and diabetes which like sprue are safety valves against overheating. He has treated patients successfully with intravenous calcium. JELKE (p. 59) reports a patient with non tropical sprue who improved on a fatless diet liver and calcein. PESCE (p. 59) treated a case of sprue successfully with milk and describes a condition which has close affinities with Hill Diarrhoea of India.

LINDEBOOM and WIJNTJES (p 60) describe a patient with sprue complicated by a condition resembling tabes. The Wassermann reaction was negative and the authors think that the condition may have been due to deficiency of vitamin B.

RIETSCHEL (p 61) quotes the work of VERZAR, who regards suprarenal hypofunction as the cardinal point in idiopathic steatorrhoea. He deals more particularly with coeliac disease the Gee-Herter syndrome of children not with sprue as seen by physicians in the tropics. The treatment suggested is described. RODRÍGUEZ OLLEROS (p 61) describes the results of gastroscopic examination of patients with tropical sprue. Atrophic gastritis similar to that seen in pernicious anaemia was the predominant lesion. It improved under liver extract therapy. BING and BROAGER (p 62) record the remarkably beneficial effect of nicotinic acid in the relief of the diarrhoea of idiopathic steatorrhoea. The other symptoms were not ameliorated to the same extent.

C W

MEIRA (João Alves) Espru (noções atuais) [Sprue. Present Views.]
—Reprinted from *Letras Médicas* São Paulo 1937 Vol. 2.
No 3 pp 41-47

An article of a general character of the nature of a lecture on the subject giving the geographical distribution, symptomatology and

clinical features the pathology diagnosis and differential diagnosis from idiopathic steatorrhoea and Gee's syndrome prognosis and treatment. As the title indicates the author gives a résumé of present day knowledge but adds nothing fresh. H H S

SPACEK (M. R. W.) Sprue.—*Irish Jl Med Sci* 1938. Apr. 6th Ser. No 148 pp 171-183

A general account of this condition containing however nothing that is not well known to readers of this *Bulletin*. Suitable for a student's lecture. H H S

SALAH (M.) Sprue in Egypt. Report of a Case.—*Trans Roy Soc Trop Med. & Hyg* 1937 Nov 30 Vol 31 No 3 pp 351-358 With 1 chart [12 refs.]

This is a clinical description of what is regarded as the first case of sprue in an Egyptian. The patient a male of 40 years was admitted with the provisional diagnosis of steatorrheic pancreatic disease or sprue.

The demonstration of marked glossitis macrocytic anaemia and the chemistry of fatty stools excluded pancreatic disease.

The diagnosis of sprue was confirmed by the response of the condition to treatment and the increase of weight by 21 kgm. on appropriate treatment. This was based on the principles laid down by FAIRLEY—the production of alimentary rest by a suitable dietary treatment of the anaemia by 300 gm. of liver *per os* followed by intramuscular injections of liver extract (2 cc. campolon for 15 days) and replacement of deficiency of gastric secretion by the addition of HCl in doses of 4 cc. t.d.s. for two months. The anaemia was of the hypochromic macrocytic type, with hypoblastic bone marrow of megaloblastic characters, suggesting deficiency of both iron and haemopoietic principle.

The patient was kept under observation for fourteen months after discharge during which time he remained normal.

P H Manson-Bahr

STALDER (H.) Die endemische Sprue. Ein klinischer Beitrag [Non-tropical Sprue—a Clinical Contribution.]—*Schweiz. Med Woch.* 1937 Nov 13. Vol 67 No 46 pp 1091-1093. With 1 chart

The differential diagnosis of endemic sprue (or non tropical sprue) from pellagra, Addison's disease pernicious anaemia tetany osteomalacia pancreaticogenous diarrhoea and mesenteric tuberculosis has been placed on a secure basis by the work of HESS THAYSEN and the monograph of HANSEN.

Reference is also made to the newer work of VERZAR who has demonstrated experimentally a relationship between the suprarenal secretion and Vitamin B₂.

Few cases of non tropical sprue have been recorded so far in Switzerland and according to Stalder they number twenty-seven in all.

Hansen has shown that many different degrees of severity of the same illness are encountered from slight cases with painless diarrhoea to the most severe with steatorrhoea Addisonian pigmentation and anaemia of the pernicious type. Tetany and osteomalacia which are also noted suggest avitaminosis.

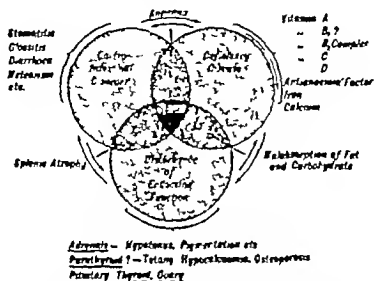
Two further cases are reported here. The first was in a man of 61 who exhibited symptoms of medium severity with fatty stools emaciation pigmentation and pernicious blood changes. Injections of Campolon produced a remarkable change in a brief period. The second was of a woman of 69. At first on account of her severe condition and pigmentation she was thought to be suffering from Addison's disease. The patient is still under treatment and a successful issue appears likely. She received a new yeast concentrate (made by the Physiological Institute in Basle) and of this she could assimilate 150-200 cc. a day. At the same time Campolon (5 cc.) every second day and occasional intravenous injections of Cortin (20 cc.) were also given. Campolon injections in the second case did not appear to exert the least effect either on the stools the general condition or the blood picture. The injections of Cortin either subcutaneously or intravenously did not influence the size of the stools. Further trials with this preparation were carried out with difficulty on account of expense. The author considers that in endemic sprue probably a secondary B₂ avitaminosis is concerned. P H M B

ROHR (Karl) Die einheimische Sprue. [Non-tropical Sprue.]—*Deut. Ztschr. f. Verdauungs u. Stoffwechselkrankh.* Leipzig 1938. Vol. 1 No 1 pp 46-51 With 1 fig.

The author's remarks are based on twenty-two cases of idiopathic steatorrhoea seen by him in the University clinic at Zurich. In nearly all the earliest symptoms were alimentary which preceded systemic disturbance by six months or so and it was the latter that led them to seek advice. The symptoms have been detailed so often and they were typical in the author's patients there is no need to repeat them here. He states however that the calcium content of the sprue stool is very high not owing to deficient absorption but to the combining of the calcium with the unabsorbed fatty acids to form calcium soaps which are soluble with difficulty. He divides anaemias into four groups: 1 Cryptogenic pernicious anaemia where Castle's principle is lacking—gastric anaemia Biermer's disease 2 Sprue anaemia from interference with resorption of anti-pernicious factors. 3 Anaemia of liver disease in particular cirrhosis, when the anti-pernicious factor is not stored in sufficient amount. 4 Anaemia resulting from toxic conditions in pregnancy diphyllobothrium infestation etc.

Sprue—he is speaking it would appear of idiopathic steatorrhoea, non tropical sprue—is explained as resulting from three coacting

factors gastro-intestinal disorder deficiency of vitamin or iron, calcium, and Castle's principle and disturbance of endocrine function. Of these the first is the most important (See Illustration.)



Illustrating the various factors which, in the author's opinion, interact to cause sprue.

[After a diagram in the *Deutsche Zeitschrift für Verdauungs- und Stoffwechselkrankheiten*]

H H S

VAN LEEUWEN (H C) De aetiologie van spruw spruwoid en chronische enteritis (Aetiology of Sprue and of Sprue-like Conditions).—*Geneesk Tijdschr v Neder Indië* 1938. Feb 1 Vol 78. No 5 pp 227-253 [53 refs.]

This is a discussion of the aetiology of sprue of idiopathic steatorrhoea and of allied conditions and is followed by a report of ten cases. The author thinks that chronic amoebiasis, deficiency of gastric hydrochloric acid, psychological factors, disturbances of endocrine glands as well as a damp and cool climate are all of importance in the causation of sprue and of sprue-like conditions. He considers idiopathic steatorrhoea to be primarily due to allergy of the small intestine and he compares the condition with vasomotor rhinitis. Pathologically there is a swelling of the intestinal mucous membrane which produces the picture of chronic enteritis with an acceleration of the passage of intestinal contents. Owing to changes in the small intestine the absorption of vitamins is impaired and this leads to other symptoms of sprue such as stomatitis. Therapeutically the author obtained good results with intravenous injections of calcium.

H Lomas.

BARKER (W Halsey) & RHOADS (C P) The Effect of Liver Extract on the Absorption of Fat in Sprue—*Amer J Med Sci* 1937 Dec. Vol. 194 No 6 pp 804-810 With 4 figs

Some disturbance of fat absorption from the intestinal tract in patients suffering from sprue has always been assumed to be an integral part of the disease

Previous studies on the fat content of sprue faeces have suggested that it is largely split thus indicating that it is not one of pancreatic function It is not clear however whether the sprue diarrhoea is to be regarded as caused by the mal-absorption of fat or whether it is the direct result of the presence of so much unabsorbed split fat in the intestines.

In previous communications CASTLE Rhoads LAWSON and PAYNE have described the improvement of the intestinal symptoms of sprue patients which follows the suitable administration of liver extract whilst MACKIE MILLER and Rhoads have demonstrated characteristic alterations of motility and outline as seen by X ray examination and that these alterations become less pronounced subsequent to injection of liver extract

In the present communication the amount of fat in the blood of normal subjects following the taking of a meal rich in fat is compared with that in patients during exacerbations of sprue diarrhoea as well as during the remissions which follow the administration of liver extract.

The method employed for the determination of the blood lipids was that described by KIRK PAGE and VAN SLYKE. Heparin was employed as an anticoagulant The subjects fasted overnight and a sample of blood was taken before the test meal of fat After repeated studies it was found that little or no change in the levels of free and total lipid cholesterol occurred after the fat meal.

The amount of lipid in the blood of four normal individuals before and after taking a fat meal was measured by the Kirk method. The results were remarkably constant the fasting levels of total lipid carbon were in the range between 320-480 mgm. per cent. The peak of the rise was reached at the end of four hours and the maximum level attained was between 550-650 mgm. per cent The results obtained from the study of the normal individuals were in agreement with those reported by Kirk Page and van Slyke.

Subsequently the amount of lipids was ascertained in three cases of sprue before and after treatment with liver extract and in two cases before treatment. All five were typical cases of sprue acquired in the tropics and of long duration. During the preliminary period of not less than four weeks all sprue patients were given a diet which contained almost no fat and limited carbohydrates but which was rich in protein and fresh fruits.

The amount of lipid in the blood of all five cases showed practically no increase following a fat meal. This fact coupled with the well-known observation that a large amount of fat is present in the intestinal contents seems to be adequate evidence that the absorption of fat is interfered with in the active phases of the disease even though anaemia and stomatitis are not present The three cases were tested again after treatment with liver extract injected intramuscularly and showed wholly different amounts of lipids in the blood. In one case one injection of liver (10 cc Lilly NNR derived from 50 gm. of

liver) was sufficient whereas in other cases several injections repeated daily were required. In all three cases a pronounced rise in the level of the total lipid carbon resulted. The resulting curve approached normal in both duration and height and presented a striking contrast to the practically flat curves obtained before treatment.

It seems to be clear that normal individuals react to a meal containing 2 gm. of fat per kilo of body weight by a pronounced and well-sustained increase of the amounts of lipid in the blood. Patients with sprue who still manifest symptoms after treatment with a diet low in fat content exhibit no such increase under similar experimental conditions.

The passage of loose bulky stools follows the taking of a test meal of fat before treatment with liver extract but this does not occur during the 6-hour period of the test but only 12-48 hours after the experiment has been terminated. The time relationship of the diarrhoea to the withdrawal of blood samples for analysis suggests that the lack of increase of the content of the blood lipid cannot be ascribed to the loss of fat from the intestinal canal but to actual failure of absorption by the intestinal mucosa. The view is gaining ground that malabsorption results in diarrhoea rather than that the diarrhoea is the cause of the malabsorption.

P H M B

HOPMAN (B. C.) Over de aetiologie van tropische spruw en verwante ziekten [The Causation of Tropical Sprue and Allied Diseases].—*Geneesk. Tijdschr. v. Nederl. Indië* 1935 Apr 19 Vol. 78. No 16 pp 904-914

Many explanations are current regarding the causation of tropical sprue. There are an infection theory, a vitamin theory, an antecedent intestinal disease, adrenal cortical insufficiency and hyper-susceptibility of the small intestine. Treatment of the disease goes hand in hand with the theory adopted and therefore the importance of the theory in the case of sprue is very obvious. The author approaches the subject by a very full consideration of basal and active metabolism for each of the standard constituents of food and lays great stress on disturbance of metabolism in the European who transported to the tropics. The whole of this argument need not be set out. A European finds himself in a warm climate and his basal metabolism falls. In spite of this his temperature is raised by half degree. He must then reduce his active metabolism in order to compensate for this rise of temperature that is to say, he takes less exercise and uses his muscles less. Correspondingly his consumption of energy should be lowered. Now the native has long ago adjusted himself to metabolic requirements but it is difficult for the European more or less suddenly to make the necessary alteration of his use and wont. One sickness or another is apt to develop in consequence of the disturbance of carbohydrate and fat metabolism.

A summary of the findings of the author may be given. For every latitude there exists an appropriate basal and active metabolism. If carbohydrate and fats are taken in too large quantity for metabolism or are insufficiently utilized various possibilities arise. 1. There develops sunstroke, an acute disease in which suddenly too few calories are used up and the man dies of overheating. 2. There develops summer diarrhoea in sucklings for the protection of the infant by excretion of undigested food, which has been ingested in

too large quantity. 3 There develops obesity. A too large intake of food, developed through excessive function of the digestive organs results in the deposit of too much fat under the skin and in the organs. 4 There develops diabetes. This usually occurs after the appearance of obesity. A dysfunction succeeds the hyperfunction of pancreas and liver. Insulin which is produced in too small quantity is no longer able to retain glycogen in the liver. 5 There develops sprue. After hyperfunction of the liver and pancreas comes a dysfunction of both organs but mainly of the liver. Bile acids are excreted in insufficient amount and the fats are badly absorbed.

Obesity, diabetes and sprue are the safety valves which protect the organism against overheating. If the body is forced to a metabolism which is beyond its powers obesity will result or it may be a more serious disease still. The treatment to be adopted is moderation in food and a sufficiency of exercise. *W F Harvey*

JELKE (Hugo) Om sprue i anslutning till ett fall av idiopatisk steatorrhé hos vuxen. [Sprue and Idiopathic Steatorrhoea].—*Hygiea* 1938, July 31 & Sept 14. Vol. 100 Nos. 14 & 15 pp. 529-568 577-629. With 6 figs. [66 refs.] German summary

The author describes a case of what he designates idiopathic steatorrhoea or sprue nostras in a man of 39 years who exhibited the symptoms of tetany. The blood phosphorus was about normal but the calcium was only 5 mgm per cent when he first came under the author's observation and he was very emaciated. Under treatment with a fatless diet liver and calcein he improved much the calcium rose in a few days to 6 mgm. and in another 3 weeks to 11.2 mgm. Cramps and tetany ceased after a week and he put on 4.6 kgm. in weight. Three months later he was attacked with a dry pleurisy and though the intracutaneous tuberculin reaction was negative X-rays showed small central calcifications. He continued to make satisfactory progress but after about a year he stopped taking any more treatment the cramps returned and a few months later he died with inflammation of the lungs.

This case is made the text for a long discussion and much quotation of literature regarding the similarities and differences between tropical sprue idiopathic steatorrhoea coeliac disease their cause and treatment but no fresh views are presented. *H H S*

PESCE (Hugo) Un caso de sprue tratado a la antigua y el síndrome espruiforme Chahuatam Akan en Andahuaylas (Apurímac, Peru). [A Case of Sprue treated in the Old Way "Chahuatam Akan, a Sprue-like Condition in Peru].—*Rev Méd Peruana* 1938, Jan. Vol. 10 No. 109 pp. 9-27

The patient was an unmarried half-breed aged 32 living in the hilly region of Cuzco. He stated that he suffered from diarrhoea 3 or 4 motions daily, copious yellowish white fatty frothy with slight tenesmus and no fever. These attacks were separated by intervals of good health [the length neither of attack nor healthy interval is mentioned]. Examination showed pallor and anaemia sprue-like tongue. There was no laboratory available, so the blood changes

cannot be detailed. Treatment by milk brought about great amelioration in a month and 18 months-2 years later there had been no relapse.

In connexion with this case the author describes and discusses a syndrome known as *chakudam akan* [which seems to mean the passage of stools of undigested food] a form of diarrhoea with pasty stools, meteorism, weakness and anaemia among those living at higher altitudes and particularly at the rainy season and affecting chiefly males. It is common in the Department of Apurimac, Peru. It has close affinities with Hill Diarrhoea of India. H H S

LINDEBOOM (G A) & WIJNTJES (J E B). *Pseudotabes bij spruw* [*Pseudotabes in Sprue*].—*Nederl Tijdschr v Geneesk*. 1938. May 7 Vol. 82 No 19 pp 2260-2266 English summary, 119 refs

If in pernicious anaemia a subacute combined degeneration of the cord can occur it might be expected that in sprue with its hyperchromic anaemia such neurological symptoms would also occur. Little mention of such symptoms is to be found in the literature. A case is brought forward by the authors in which symptoms very suggestive of tabes dorsalis were present along with apparently clear sprue. The patient, an unmarried woman 58 years of age had spent some time in Java a number of years previously but had remained well there except for one day's mucous diarrhoea. At the time of the present examination she was emaciated and her face of brown colour like Addison's disease. There were atrophic glossitis, a macrocytic anaemia and a fat diarrhoea, making the diagnosis of tropical sprue a very likely one. While this was fairly established it was the nervous syndrome which proved interesting. Patellar and tendo Achillis reflexes were absent as also were the plantar and abdominal reflexes, while the tendon and periosteal reflexes of the upper limbs were sluggish. On the other hand, except for a slight temporary hypalgesia, there was no loss of surface or deep sensibility. It seemed possible then that not a subacute combined degeneration of the cord but a peripheral neuritis might account for the symptoms but there was no trace of reaction of degeneration. More interesting still were the pupillary reactions. One pupil was of medium diameter the other was narrowed and there was a definite Argyll-Robertson phenomenon. One explanation of the case would be that there was present a combination of tabes and sprue but the Wassermann reaction was negative and examination of the cerebrospinal fluid gave no support to that suggestion. Then again it is known that pupillary disturbances are a common symptom in chronic alcoholism. But here the question arises how far that symptom is to be attributed directly to alcohol and how far to an avitaminosis B dependent on gastritis and defective absorption. This brings the authors to the main point of their thesis, that neural symptoms and even an Argyll-Robertson pupil should at least be looked for as a manifestation of vitamin B deficiency.

In this particular case treatment with diet and liver cured the sprue but even parenteral administration of vitamins B₁ and B₂ failed to make any impression on the neurological syndrome.

W F Harry

RIETSCHEL. Zur Pathogenese und Therapie der Sprue insbesondere der Sprue der Kinder [Coeliakie] (Gee-Herter Heubnersche Erkrankung) [Pathogenesis and Therapy of Sprue with Special Reference to Sprue of Children (Coeliac Disease, Gee-Herter-Heubner Disease)]—*Deu. Med. Woch.* 1938 Jan. 14 Vol. 64 No 3 pp 73-78

[The terminology which we in English-speaking countries recognize as Coeliac Disease appears to present considerable difficulties to Continental writers. The plea to term the syndrome "Sprue der Kinder" (child sprue) will have few supporters and fewer still to add another cognomen in honour of HESS THAYSEN HANSEN and V. STAA, who have striven to unite all the steatorrhoas under one heading. We venture to think that hardly a single pediatrician in English-speaking countries will be found to support the view that coeliac disease in children and sprue in the adult are in fact the same disease.]

In this paper no new observations are made but it is a restatement of all the various theories which have been adduced from time to time. The theory of bacterial infection or vitamin deficiency finds few supporters. The work of VERZÁR (on animal experiments) is discussed at length. As is well known this authority has shown that the absorption of sugar through the intestinal wall is dependent upon the functions of the suprarenals—in the adrenalectomized animal the fat which is split in the intestines is no longer synthesized so that the animal does not grow mainly because it lacks lactoflavin—a kind of pro-vitamin—and can no longer create the active flavin phosphoric acid which is a ferment necessary for respiration. VERZÁR has applied this knowledge to sprue (or more accurately idiopathic steatorrhea) and looks upon the suprarenal as the vital point in this disease and he believes that he can explain the whole symptom complex of sprue by a hypofunction of the suprarenals of the cortex as well as the medulla therefore lactoflavin (B_2) and the cortical hormone in large doses are recommended as therapeutic agents. The author believes that he can combine the various theories of Thaysen Hansen and Verzár into some intelligible system of therapeutics.

The cardinal therapeutic indications are to overcome the overwhelming bacterial preponderance in the small bowel the restoration of the normal bactericidal action and the neutralization of acidosis.

It is intelligible that one can restore the normal hormone interchange by the addition of vitamins in avitaminotic disturbance. As a means of restoring the normal intestinal function especially in children the use of human milk is advocated, a matter which he thinks has been much neglected. The administration of albumin has also a favourable action and a pure fruit and apple diet (pektin) is also advocated.

P H M-B

RODRÍGUEZ OLLEROS (Angel) The Stomach in Tropical Sprue.—*Puerto Rico Jl. Public Health & Trop. Med.* 1938 June. Vol. 13 No 4 pp 503-521 [11 refs.] [Spanish version pp 485-502.]

The present paper is concerned with the results of 28 gastroscopic examinations in as many patients suffering from tropical sprue. The investigated cases were divided into complete, "incomplete and latent" types but in every instance at one time or another each patient had shown all the features which are accepted as

characterizing the fully-developed sprue syndrome. The predominant lesion demonstrated by gastroscopy proved to be some type of atrophic gastritis—sometimes it was generalized and at other times only a limited area of the stomach was implicated. The gastroscopic findings were similar to though less intense than those described in pernicious anaemia and the atrophy of the gastric mucosa was regarded as developing secondarily to the syndrome of sprue and the anaemia. The condition improved with liver extract therapy in much the same manner as has been found in pernicious anaemia.

A Hamilton Fairley

BING (J) & BROAGER (B) *Undersøgelser over virkningen af nikotinsyre-indgift paa to patienter med idiopathisk steatorrhoe (sprue)* [Investigations of the Action of Nicotinic Acid Medication on Two Patients with Idiopathic Steatorrhoea (Sprue)]—*Ugeskr. f. Læger* 1938 Vol 100 pp. 1131-1137 With 3 figs. [54 refs.]

This Danish study shows the remarkably beneficial action of nicotinic acid in sprue which has of late been found to be by no means rare in Denmark. The authors give an account of two patients, women of 49 and 28 respectively who suffered from well-defined idiopathic steatorrhoea. Not only did the diarrhoea cease with the administration of nicotinic acid (as is usual in the diarrhoea of pellagra) but it also recurred when this drug was discontinued. The improvement in the other manifestations of the disease—emaciation meteorism stomatitis anaemia low blood-pressure pigmentation a flat blood-sugar curve hypocalcaemia and osteoporosis—was by no means so marked. [That tropical sprue and idiopathic steatorrhoea of temperate climates are the same is by no means proved at present.]

C Lillingston

JUNIOR (Peregrino) *Sprue doença de carencia. (Sprue a Deficiency Disease).*—*Brasil-Médico* 1937 Aug 28. Vol. 51 No. 35 pp. 901-903

CASTELLANI (Aldo) *Sprue and Pernicious Anaemia.*—*Jl Trop Med. & Hyg* 1937 Nov 15 Vol. 40 No. 22. pp. 281-284

MEDICAL AND SANITARY REPORTS

UGANDA PROTECTORATE (1937).

The Uganda Protectorate lies in the northern part of the Great Lakes region of Africa. It has no sea coast, being bounded by the Anglo-Egyptian Sudan on the north, Kenya Colony on the east, Lake Victoria Nyanza and the Tanganyika Territory on the south, and the Belgian Colony on the west. The area of the Protectorate is estimated at 94,204 sq miles including 13,616 sq miles of water. (The area of England without Wales is a little over 50,000 sq miles.) The head quarters are at Entebbe and the chief commercial towns are Kampala and Jinja. All three are on or near the north shore of Lake Victoria.

Vital Statistics—For the native population only, the principal facts are as follows—

Province	Estimated Population	Live Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
Buganda ..	888,244	20,073	22.6	16,004	18.0	1,593	79.4
Eastern	1,189,204	29,977	25.2	26,141	22.0	5,188	173.1
Western	741,231	19,010	25.6	11,921	16.1	2,494	131.2
Northern	807,520	23,009	28.5	14,669	18.2	5,037	219.8
Protectorate	3,626,549	92,069	25.4	68,735	18.9	14,332	155 "

The above figures summarize the excellent Tables which provide data in great detail for both Provinces and Districts in the Protectorate.

European Officials resident numbered 595 with an average number resident of 499. One invaliding and four deaths were recorded. Among European *non-officials* 1,837 cases of sickness were treated by Government Medical Officers, *malaria* accounting for 371 of the cases dealt with, *injuries* 113 and *diseases of the digestive system* 110. There were 16 deaths recorded among European *non-officials*.

Asian Officials resident numbered 387 with an average number resident of 323. Three were invalided but no deaths were recorded. The Government Medical staff treated 8,124 cases of sickness among *Asian non-officials* and 75 deaths were reported within this group.

African Officials (African Civil Service) resident numbered 212 with an average number resident of also 212. There were no invalidings but one death occurred within this group.

Among all groups of officials and *non-officials malaria* was the principal cause of ill-health.

Maternity and Child Welfare—Though the Provincial and District infant mortality and maternal mortality rates have been subject to variation during the past seven years for the Protectorate as a whole these rates have declined steadily and testify to the efficacy of ante-natal and child welfare work in the territory. It is said that little progress has been made in increasing the number of maternity centres yet despite this and other handicaps the tabulated facts supply ample evidence not only of the considerable volume of work dealt with but also of the success achieved in this important field. For example during the year under review 16,676 women attended for ante-natal supervision.

at the larger centres 1 745 of them terminated their pregnancies in hospitals or at maternity centres and among them 1 576 live births and 82 maternal deaths were recorded. On the other hand a further 484 women who had not availed themselves of ante-natal treatment were delivered in hospitals of 311 live babies with 42 maternal deaths. The figures for those who did not attend for ante-natal supervision again compare unfavourably with those who did. Then again, 2 116 women after attending ante-natal centres were reported to have been confined in their own homes where they gave birth to 2 024 live babies with only 16 maternal deaths. *Infants attending Welfare Centres* numbered 17 792 these figures relate only to healthy children brought to the centres for advice and supervision—sick children are included in hospital and dispensary returns.

Patients admitted to the wards of the *Lady Coryndon Maternity School* numbered 569 during the year 410 confinements, 312 live births, 14 infant deaths and 33 maternal deaths were recorded. The Out-patient Department dealt with 2 948 expectant mothers and undertook the post natal supervision of 631 babies. At 22 country centres there were 1 809 confinements, 1 523 live babies were born, infant deaths numbered 37 and maternal deaths 6 at these centres 11 184 new ante-natal cases were dealt with 13 899 attendances were recorded at child welfare clinics, and total out patient attendances were 63 742.

To the wards of the *Vsambwa Maternity Training School* 371 patients were admitted, confinements numbered 285 live births 260 while 18 infant deaths and 10 maternal deaths were recorded. At 15 country centres confinements totalled 1 906 live births 1 805 infant deaths 23 and maternal deaths 11 records at these centres also include mention of 4 272 new ante-natal cases 2 892 attendances at child welfare clinics and 37 872 out-patient attendances.

With regard to the *training of nurses and midwives* at the *Lady Coryndon Maternity Training School* of the 39 students in training 14 were successful in obtaining the Certificate of the Uganda Midwives Board, and at the *Nsambya Maternity Training School* 7 of the 30 native students in training obtained this qualification. There are now 63 European and Asian and 217 African Midwives on the registers of the Uganda Midwives Board. It remains to add that during the year a district midwife was posted to the township of Horma for special ante-natal work among native women. If this experiment proves successful it may lead to extension of trained supervision of maternity work among African women with corresponding decrease in obstetrical disasters.

School Hygiene—Periodic visits of inspection continued to be made to schools in most districts by Medical Officers and their assistants (see this *Bulletin* 1938 Supp. p. 67*). In Busoga the Senior African Medical Assistant examined the pupils at Mwiru College treatment was provided where necessary. The experiment in nutrition in the Mengo District (see this *Bulletin* 1938 Supp. p. 67*) was concluded with the most encouraging results. In an Appendix to the Report under review Drs J. Scott Brown and L. J. A. LOWENTHAL report the results of the investigation under the title of *The Value of Milk as an Adjunct to the Diet of School Boys*. After a routine examination of the boys attending the C.M.S. School at Mukono 30 were chosen at random and each given half-a pint of milk on every day of attendance. Briefly results show a significant extra gain in

height, that the small superiority in weight gain was not statistically significant and that optimum nutrition is not obtainable from normal African diets. A fuller account of the investigation appeared in the *East African Medical Journal*. The investigation continues and a similar experiment is in progress at Teso.

Public Health Sanitation etc—No new schemes of development were introduced during the year. The policy outlined in 1934 (see also this *Bulletin* 1937 Supp pp 46-47*) was however steadily pursued and of this it is said that in certain places the first fruits are beginning to appear. Considerable progress is reported with the Kampala *sewerage system* and though the disposal works are not yet completed a number of houses have already been connected up to the sewers. Several houses in Entebbe have septic tank installations though these cannot be brought into use until the piped water supply from Lake Victoria has been completed. Government houses in Mbale also have septic tank installations operated in connexion with the newly constructed gravity water supply. In Government quarters in Fort Portal the double bucket system is in use and in the larger and some of the smaller townships the single bucket system is used. Dr W H KAUNTZE C M G Director of Medical Services contributes an interesting commentary on rural sanitation and of how sanitary ideals are to be realized in spite of inherited native beliefs. The provision of a filtered and chlorinated piped *water supply* was partially completed in Mbale and in Entebbe while in rural areas the protection of water supplies continued to receive special attention.

With regard to *housing and town planning* it is reported that new Asian dwellings are being built to better design that building rules are strictly enforced, and that Africans are gradually developing an interest in model housing schemes. The provision of cheap housing for Africans is a problem of urgency in the townships where efforts are being made to improve living conditions by laying out plots in areas zoned for certain classes of housing. A detailed description is given of a two-roomed house suited to the needs of the general African population and costing between £20-£25 to build. A Committee has been appointed to investigate *labour conditions* in Uganda meanwhile the standard of housing of labourers is said to improve.

The question of *food in relation to health and disease* is receiving special attention. The Report of the Nutrition Sub-Committee of the Agricultural Survey indicates that large sections of the population suffer from malnutrition steps have already been taken with a view to improving existing conditions (see the experiments with milk diets under *School Hygiene* above). Agricultural surveys continue to be made to determine the quantity and quality of locally grown foodstuffs while selected youths are trained in improved farm methods at farm schools at Lira and Gulu. Rules for regulating the sale of *milk* are in course of preparation.

Health propaganda continues to be carried out in all districts with encouraging results.

The training of African Sanitary Inspectors has progressed satisfactorily (see this *Bulletin* 1938 Supp p 58*) and the final examination of the first batch of students will take place in November 1938 under the auspices of the Royal Sanitary Institute London.

Hospitals Dispensaries etc (see also this *Bulletin* 1938, Supp p 59*) The Tororo Hospital which will provide in and out-patient accommodation for Asians and Africans approaches completion.

To the Jinja Hospital, two new African wards an Asiatic Maternity Ward, out-patient block and other constructions were added. Minor improvements were carried out to other hospitals in the Protectorate. Three new dispensaries and two additional dressing posts were opened during the year.

The training of African female nurses continues at the hospitals at Namirembe and Mulago with successful results.

The records of the year's work at hospitals and dispensaries is summarized below —

Hospitals, etc.	Beds	Admissions	Treated	Deaths	Total New Cases	Total Re-Attendances
4 European	34	533	—	—	499,834	533,727
9 Asiatic	56	1,655	—	—		
23 African	1,277	31,250	—	—		
87 Dispensaries	625	?	—	—	548,727	1,152,941
Totals	1,992	33,443	34,487	1,799	1,088,661	1,686,668

A new nomenclature has been adopted for the tabulation of diseases and deaths in the Uganda Annual Medical Reports. This new departure permits the presentation of the relevant facts within the limits of *three pages* in place of the 13 pages formerly necessary for this section.

Medical Education—The Report of the Commission appointed by the Secretary of State for the Colonies to advise on higher education in East Africa drew attention among other matters to the fact that the basic education of the African recruit to the medical course is very deficient and that his knowledge of the preliminary sciences is not of a sufficiently high standard. To meet these requirements the new biology, chemistry, and physics laboratory under construction at Makerere College should enable the standard of these courses to be raised considerably. A new building is to be erected to replace the present medical school which lacks adequate accommodation.

The Report of the Uganda Medical School describes the year's work and presents details of the numbers of students taking the various grades of examination results of those examinations and the more significant comments made by the external examiners. It is noted that since 1923 thirty-five students have been licensed to practise and 30 of these are in the service of the Uganda Government.

With regard to *morbidity experience* during the year it is stated that with the exception of malaria and blackwater fever a general decrease in the incidence of the major communicable and infectious diseases was noted during 1937. The notes which follow briefly summarize more extensive commentaries in the Report relating to the principal diseases dealt with at hospitals and dispensaries.

A further increase in the number of malaria cases is reported viz 72,258 as compared with 71,407 in the preceding year (see this *Bulletin* 1938, Supp. p. 59*). Of the total cases recorded 31,314 were dealt with at station hospitals and 40,924 at dispensaries, while at all centres approximately 50 per cent. of the cases were microscopically diagnosed. On the other hand the *Return of Diseases and Deaths* shows that 32,142 in- and out-patients were treated for the

disease the distribution of types of infection being *t-rign tertian* 1,997 *quartan* 1,304 *subtertian* 7,800 and *unclassified* 21,041 hospital deaths ascribed to the disease numbered 134. The usual routine anti-malarial measures continued to be carried out at most stations with reclamation of swampy areas sub-soil drainage controlled tipping and other works in specific areas.

Of *blackwater fever* 170 cases and 43 deaths were reported and of these 86 cases with 23 deaths were treated by Government Medical Officers and the remainder by private practitioners. Of the total cases 14 were European (4 deaths) 150 Asians (38 deaths) and only 6 African, with 1 death. The incidence and distribution of blackwater fever in Uganda is set out in great detail in an admirable series of tabulated statements with distinction as to race province district age etc.

No case of *yellow fever* was reported during the year. In view of the suspicious cases reported by the District Medical Officer Masaka in 1936 that District first engaged the attention of the *Yellow Fever Commission* of the Rockefeller Foundation (see this *Bulletin* 1938 Supp. p. 60*). No cases of clinical yellow fever were seen while sera from 35 cases of fevers of undetermined origin when inoculated into animals gave negative results. Protection tests were carried out sera from 37 children all gave negative results but 6 from 174 adults were positive. The Commission continued investigations in the Bunyoro Chua and West Nile Districts of the Northern Province with somewhat similar results. In Bwamba County of the Toro District (Western Province) 25 sera from 53 adults gave positive findings. Protection tests were carried out on 141 people of all ages—sera from 16 were positive. Results suggest that a jungle type of yellow fever may be present in Bwamba. Measures to combat *Aedes aegypti* were continued. The Government Entomologist reports that investigations into the incidence of *Aedes aegypti* were carried out in rural areas in the West Nile District and in the vicinity of Kampala these investigations continue.

It is said that *plague* appears to be undergoing its periodic fall in incidence and that the decrease in the number of cases during 1937 is not due to any real improvement in its control which will only become effective when the African builds for himself a house which contains no real harbourage for rats and adopts habits of food storage and refuse disposal which deprive the rodent of any food. During the year under review 515 cases with 478 deaths were recorded and of these 371 cases with 338 deaths occurred in the Eastern Province, and 112 cases with 108 deaths in the Mengo District of Buganda Province. Cyano-gassing of infected huts continues as a routine measure but de-thatching of infected huts has been applied more extensively. At the Laboratory 377 smears were examined for the presence of *P. pestis* but findings are not recorded. The Government Entomologist reports that tests carried out with ferrets for the destruction of rats (see this *Bulletin* 1938 Supp. p. 60*) were unsatisfactory the size of the male animals preventing them from reaching places accessible to the rodents two female ferrets are to be tried. Rat and flea surveys were carried out in various areas.

Of *relapsing fever* 453 cases were reported, but total deaths due to this cause are not stated. Of the total cases 375 were microscopically diagnosed and 367 were treated in hospitals with 25 deaths. The Government Entomologist experimented with various larvicides for

the destruction of *O. mombasa* these tests continue. Five cases of typhus were recorded. The value of the Carnie disinfectant in controlling the disease is again emphasized (see this *Bulletin* 1936 Supp. p. 47* and 1937 p. 49*). There were 310 cases of cerebrospinal meningitis with 118 deaths. The disease appears to be endemic in the Western Province and Masaka (Buganda Province) while sporadic cases occurred in other areas. All the cases (72) reported from Busoga (Eastern Province) are stated to have occurred in immigrant labourers. Segregation of contacts in temporary shelters has been continued (see this *Bulletin* 1938 Supp. p. 61*).

No case of smallpox was notified but the vaccination campaign was continued. 487,525 vaccinations were performed during the year and it is said that over 75 per cent. of the total population are now protected. Attention is being directed towards maintaining immunity by vaccinating all children at schools inspected by Medical Officers.

Trypanosomiasis.—During the year under review only 728 new cases with 14 deaths were reported. The decline in incidence by comparison with 1936 experience is striking but it is noted that the disease remains a major problem in the West Nile District where 700 of the total cases and 8 deaths occurred during 1937. The Kolch River area of the West Nile District has suffered such serious depopulation through the gradual voluntary movement of the people southwards that it is doubtful whether the small numbers of inhabitants remaining will be sufficient to maintain the clearings at the river crossings. The movement of people to new areas has served to increase the incidence of trypanosomiasis in those areas, and has introduced new difficulties and problems to be dealt with. Control measures were maintained as previously described (see this *Bulletin* 1938 Supp. p. 61*) particular attention being paid to the experimental "rod-clearings" which are clearings 10-20 yards wide along the banks of a stream designed to reduce fly density to limits within which the risks of infection become very small. The pass system allowing natives to travel between Uganda and the Sudan along certain defined routes was introduced during the year and has functioned successfully. Illicit movements of people have been converted into controlled movements with examination of travellers at certain gland posts. The pass system over the Tanganyika-Uganda border is being maintained.

The Government Entomologist completed his tsetse fly surveys of the Gulu District. It was recommended that re-population of the restricted areas must be carried out gradually and under strict administrative control. The clearings in the West Nile and Madi areas (Northern Province) were also visited.

Cases of tuberculosis (all forms) among in and out patients dealt with at Government hospitals totalled 613 and of these 520 were cases of the pulmonary type of the disease. Hospital in-patient cases were pulmonary tuberculosis 283 with 82 deaths other forms of tuberculosis 57 with 20 deaths. The investigations of Dr. CARMICHAEL, Senior Veterinary Research Officer were continued. During the year 51 specimens of sputum from phthisis patients were examined, the causal organism in all cases being of the human type. It is observed that among upwards of 250 specimens of sputum examined up to the end of 1937 four were caused by the bovine type of bacillus. With regard to other respiratory ailments, the pneumonias were responsible for 2,038 cases and of these 1,665 were treated as hospital in-patients.

and 369 died. *Bronchitis* was responsible for 6 777 cases of which 439 were in patients and 6 died.

At Government hospitals 102 patients were treated for *typhoid fever* with 31 deaths and 8 for *paratyphoid fever* with 1 death. A small epidemic which broke out in Kampala was traced to a polluted water supply a piped water system was brought into use and the outbreak ceased within 14 days. *Dysentery* gave rise to 2 023 cases with 58 deaths, the distribution of types of infection being amoebic 652 bacillary 281 and unclassified 1 090. It is also noted that the returns show 6,231 cases of *diarrhoea and enteritis* and 29 147 cases of other diseases of the digestive system.

Helminthic diseases especially infections with *ascaris* and *ancylostoma* are said to occur widely. Infected persons are treated with anthelmintic drugs but re-infections are frequent by reason of insanitary habits preventive measures are directed mainly towards the provision of latrines and educational propaganda. Of *ankylostomiasis* 1 761 cases were recorded during the year the results of stool examinations by Medical Officers in seven areas showed infection rates ranging between 23 and 77 per cent. The condition though widespread is said to be the cause of little disability. *Taeniasis* is common in the Western Province and in districts where animal husbandry is an important industry. 2 034 cases were dealt with in Uganda during 1937. *Dracontiasis* of which 639 cases were recorded is again said to be confined to the Nikotic districts of the Northern Province efforts are being made to provide protected water supplies. *Ascariasis* gave rise to 881 and *schistosomiasis* to 126 cases during the year under review. No cases of *filariasis* were treated in hospitals but *Onchocerca volvulus* is said to be extremely common in the Sezibwa river area of Buganda while the infection is also said to be common round the head waters of the Nile.

Veneral Diseases show increased incidence. The incidence and distribution of *syphilis* and *yaws* read as follows —

Province	Hospital Cases		Dispensary Cases	
	Syphilis	Yaws	Syphilis	Yaws
Buganda	11,881	992	19,230	2,062
Eastern	10,871	3 918	11 718	6 780
Northern	1,821	12,701	1 666	11,245
Western	2,189	4 673	8 045	22,887
Totals	26,862	32,284	40 659	43 074

The distribution of *gonorrhoea* is not given but the 16,236 cases treated are an increase over 1936 records. The results of treatment are said to be unsatisfactory owing to the irregular attendance of patients.

Leprosy—At Government hospitals and dispensaries 1 067 lepers attended for treatment during the year under review. The Reports of the *Mission Leger Colonies* testify to the admirable work which continues to be carried out at these institutions from these Reports the following details have been extracted —

Leper Colony	Supervised by	Inmates
Buluba, Basoga	Franciscan Sisters	68
Nyengo, Mengo		208
Bunyoni, Kigeni	Church Missionary Society	847
Kumi Children's Home	" "	354
Teso Ongwo	" "	411

Other diseases mentioned in the Official Returns include 2,403 cases of *trachoma* which still remains an important cause of blindness in Uganda other diseases of the eye and annexa were responsible for 11,725 cases. Out of 53,289 cases of affections of the skin cellular tissue and organs of locomotion no less than 35,059 were due to tropical ulcers this condition was commented upon in the 1936 Report (see this Bulletin 1938 Supp. p. 63*). For rheumatic conditions 20,081 patients received treatment nephritis gave rise to 2,927 cases and 82 deaths while 48,725 patients were treated in the group external causes.

Scientific—The Laboratory Report records that examinations carried out during the year totalled 50,464. The numbers of specimens received and examined are grouped under various headings parasitology serology but findings are not recorded. The Report of the Government Entomologist has already been referred to in the above summaries.

Scientific papers published by members of the staff of the Medical Department include the following—

LOEWENTHAL (L. J. A.) A note on Tick typhus in the Eastern Province of Uganda.—*East African Med. J.* 1936 Vol. 13 p. 141.

— The place of logic in Medical Education.—*East African Med. J.* 1936 Vol. 13 p. 204.

— Diseases of the Skin in Negroes.—*Journal of Tropical Medicine & Hygiene* from September 1936 to December 1937. A series of articles published at various times.

— DE COURCY IRELAND (M. G.) and HOSKING (H. R.) A survey of Health and Agriculture in Teso Uganda.—Uganda Government Press, Entebbe.

GIBBINS (E. G.) Notes on the Breeding Habits of some House Frequenting Flies in Uganda.—*East African Med. J.* 1937 Vol. 13 p. 318.

ROBERTS (C. F.) Peptic Ulcer in Uganda.—*East African Med. J.* 1937 Vol. 14 p. 88.

BARRATT (R. E.) A Portable Steam Disinfectant.—*East African Med. J.* 1937 Vol. 14 p. 132.

— An enquiry into Diet and Nutrition amongst Indian school children in Kampala with special reference to the Consumption of Milk.—*East African Med. J.* 1937 Vol. 14 p. 199.

TROWELL (H. C.) Pellagra in African Children.—*Archives of Disease in Childhood* Aug 1937 Vol. 12 No. 70.

Financial—Expenditure on Medical Services during 1937 amounted to £178,500 a sum which represents 9.0 per cent. of the total revenue of the Protectorate during the same year. P. Grawville Edge

NYASALAND PROTECTORATE (1937)

Nyasaland Protectorate consists of a strip of land about 520 miles long by 50 to 100 miles broad lying to the west and south of Lake Nyasa. Its neighbours are Northern Rhodesia to the west Tanganyika to the north and north-east and Portuguese East Africa to the south. Its total area is approximately 37 596 sq miles of land and 10 353 sq miles of water and its chief towns are Blantyre Lumbe and Zomba (the headquarters of the Government)

Vital Statistics—In previous issues of this Supplement attention has been called to the commendable efforts made by Dr A. D. J. BEDWARD WILLIAMS Director of Medical Services and Medical Officers to secure dependable records relating to the population and state of the public health in Nyasaland. These efforts have continued unabated and the Report under review refers repeatedly to the first-rate importance of vital statistics as an instrument for the efficient administration of public health work. Dr Bedward Williams observes that Vital statistics are a measuring rod of the sanitary progress of a country they have become an essential for every properly organized community and again One of the most important problems to be solved is the collection of accurate vital statistics. It is absolutely necessary to have a yard-stick to measure the progress made in preventive and curative medicine. No programme of development can be efficiently prepared until data are obtained as to the morbidity of the people as to birth and death rates infant mortality etc. The legal mechanism exists in the form of the *Statistics Ordinance 1935* this should now be applied.

But though registration of births and deaths is not yet compulsory in the Protectorate small scale enquiries have continued to be carried out in limited areas as in previous years (see this *Bulletin* 1936 Supp p 58* and 1937 Supp p 61* and pp 63*-65* and 1938 Supp p 72*) to secure dependable facts relating to a primitive people. For example in the *Fort Manning District* records of births and deaths continued to be maintained throughout the year among an estimated population of 35 000 the birth and death rates were 49.4 and 22.8 per 1 000 persons respectively and the infant mortality rate 61.9 per 1 000 live births. In the *North Nyasa District* vital statistical effort was confined to 24 villages having a population of 4 757 persons and in this group birth and death rates were 42.4 and 28.5 per 1 000 respectively and the infant mortality rate 272.2 per 1 000 live births. In the *West Nyasa District* three native authorities sought permission to introduce birth and death registration in their respective areas. This commendable pioneer effort received the warm support of the district Commissioner and the necessary Order was introduced on July 1st 1937 and remained in force until the end of the year whole-time clerks being employed travelling from village to village collecting the returns. The records for these areas for the last six months of 1937 include the following—

Native Authority	M.	F.	Persons	Births	B.R.	Deaths	D.R.
Mbwana	4 481	5 118	9 599	229	47.7	67	14.0
Kabunduh	2 626	2 872	5 493	237	86.2	74	26.9
Atonga Tribal Council	15 707	18 259	33 966	482	28.4	291	17.1
West Nyasa District	22 814	26 249	49 063	948	33.6	432	17.6

With the exception of the isolated effort made in the West Nyasa District and referred to above *official recognition* so far as the vital statistics of Africans are concerned *has been given to the census enumeration only*. It is regrettable to note that financial considerations will not permit the continuance of this valuable experiment on the part of the Native Authorities in the West Nyasa District during 1938.

That other important medico-statistical enterprise which in recent years has been a special feature of public health work in Nyasaland and which takes the form of *Medical Surveys* will be discussed at a later stage in this Summary. Meanwhile the available statistics for the Protectorate as a whole may be set out as follows —

Race	Population	Births	Deaths
Europeans and Whites	1,894	29	18
Asiatics	1,631	83	19
Africans	1,635,804	Not known	Not known

European Officials resident numbered 279 with an average number resident of 225. Five were invalided and one died. *Native Officials* (and Native Troops and Police) numbered 2,752 and among these 12 deaths were recorded.

Maternity and Child Welfare Work.—It is observed that owing to lack of funds and staff little progress can be reported on the field of medical endeavour devoted to the interests of women and children in Nyasaland until provision has been made for the establishment of maternity and infant welfare centres facilities for the adequate nursing of women and children, accommodation for native women undergoing training as nurses and midwives and the appointment of health visitors etc. And yet despite these serious handicaps there has been a satisfactory increase in all branches of maternity and child welfare work at the African Hospital Zomba which is the only Government centre so far established in the Protectorate. At this centre 83 new ante natal cases were dealt with 55 labour cases conducted and attendances at the child welfare clinic totalled 1,262. At this Hospital two certified midwives are employed, and 14 native nurses are undergoing training. Maternity work performed at other Government African Hospitals is said to be "almost negligible" owing to the lack of European nurses or trained native female staff. Extracts from the Annual Report of the Jeanes Training Centre are of first rate interest and importance and strikingly demonstrate some of the difficulties encountered when efforts in the interests of expectant mothers are attempted among a primitive people and how some of these difficulties may be overcome. For example after pointing out that "the root of the trouble is in the deeply grounded fears and tribal taboos in the uneducated village woman" the Report goes on to say

We have found it wise to let the village women observe any African taboos to which they firmly believe so long as these do no harm."

the mental distress caused to patient and relatives by needless infringement of the taboos only adds to the reluctance of village women to seek help or enter the hospital, etc. Native midwives are allowed to be present at deliveries of their patients in the hospital. This permission, it is said, "has done much to remove the antipathy of these professional African practitioners who might naturally be

expected to be suspicious of and to resent anything which would lead to the loss of their means of livelihood, i.e. midwifery fees while it is hoped that as observers they may acquire knowledge of European midwifery methods.

Government continued to collaborate with and subsidize the Missions undertaking maternity and child welfare work. At the centre maintained by the Church of Scotland Mission at Blantyre four women were trained as midwives during the year and two new infant welfare centres were opened. Native midwives are also trained at the Mlanda Centre of the Dutch Reformed Church. Eight girls are in training at Bandawe and at the infant welfare centre 3,805 attendances were recorded.

The figures below summarize the volume of work carried out at centres other than the African Hospital Zomba subsidised by Government—

(a) Infants registered at Welfare Centres (b) Confinements conducted	Mlanda Mission	Blantyre Mission	Jeanez Centre
	532 118	203 437	46 73

School Hygiene—All European schools were inspected during the year and general health conditions of the pupils reported to be satisfactory. With regard to African schools it was hoped that at least one such school in each district would be examined during the year but the pressure of routine work prevented this programme from being carried out and only a small percentage of the schools were visited and 731 children medically examined. The Report under review describes the results of inspections carried out at five African schools viz—

The Central School Karonga where 251 boys and 38 girls were examined. Two early cases of leprosy were discovered.

Providence Girls School Mlanje—A high incidence of helminthiasis among the 167 pupils examined.

Kasina Mission School Dedza—General improvement in physical condition, etc. among the 108 pupils examined due to adequate dietary and attention paid to personal hygiene.

Mission School Mponda's Fort Johnston—Latrine accommodation insufficient. Pupils examined 107. medical treatment given where necessary.

Catholic Institute Blantyre—A considerable improvement noted in the condition of the 60 pupils examined. stricter attention to matters of diet etc. recommended.

The results of *Medical Surveys* (see hereafter *Public Health* also this *Bulletin* 1937 Supp. pp 63*-64* and 1938 Supp. pp 72*-73* 76*) are presented in detail in a series of Tables in the Report under review.

Results are assembled from seven areas in the Protectorate in three age-groups the first of which relates to children aged 0-10 years haemoglobin estimations the results of blood film aged spleen urine and stool examinations are among the data tabulated.

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historical development of the health services of Nyasaland, reviews the work performed by the Medical Department and progress made during the past 25 years, and submits recommendations for the future development of public health work in the Protectorate. This valuable section of the Report should be read in its entirety for limits of space in this *Supplement* prohibit the adequate summary which the contribution merits.

With regard to the work of the Department generally it is said that there is little that is new to record. In the larger townships the disposal of night soil and rubbish has been satisfactorily dealt with water supplies installed, drainage schemes carried out, and other sanitary improvements effected. But in the rural areas difficulties of a very special nature are encountered while the lack of trained sanitary staff European and African, tends to retard progress. Nevertheless, that the arduous and self-sacrificing efforts of Medical Officers have in many instances been successful in bringing about notable improvement in several areas, is evident from the extracts quoted from the reports of Medical Officers, as for example —

Fort Johnston — A determined effort was made to commence the important task of rendering the natives really used to the idea of latrines as part of their ordinary life, and not a meaningless ritual forced upon them. The idea was to have finally a latrine for every hut. No labour was provided. No compulsion of any kind was used. explanatory talks were given. Nearly 200 latrines are in use and construction is still going on.

Dedza — The degree with which advice has been followed with regard to sanitary matters varies in direct proportion to the character and capability of the Native Authority concerned. Kachindamoto's area is the most satisfactory. A mass hookworm campaign was carried out. A propaganda meeting was attended by some 300 natives.

Doma — Of Sendeza it is said. Some sanitary work has been done. The village headman is helpful, and the local school-teacher helps him. New houses constructed and latrindization is complete.

Kola Kola — Vaccinators have done good work in rural sanitation. Of the Protectorate as a whole it is noted that increased attention has been given to the protection of water supplies and that the boring of wells has been undertaken by the Geological Department.

The objects envisaged by the *Medical Surveys* to which reference has been made above and in previous issues of this *Supplement* are (a) to bring Medical Officers into closer contact with village life and (b) to obtain by actual examination of the inhabitants of selected areas a knowledge of the population, births deaths, and morbidity etc. of such areas. These surveys have proved conspicuously successful, and during the year under review enquiries were carried out in seven areas. In three areas it was found possible to undertake surveys (a) among villagers resident at lake level, and (b) among others living at an altitude of over 3 000 feet. The results of these investigations are set out in three age-groups in a series of Tables (see above also *School Hygiene*) together with the commentaries on results by the Medical Officers conducting the surveys. The report of an additional survey conducted at the Jeanes Training Centre is dealt with separately as it relates to natives from many districts.

Inspections of labour conditions on estates were continued, the visits have been instrumental in bringing about general sanitary improvements. The emigration of adult males to the Rand mines continues (see this *Bulletin* 1937 Supp p 65* and 1938 Supp p 75*) with serious results so far as native social life is concerned—there is a lack of fit adult males for carrying on the routine work characterizing the daily lives of the people while returning emigrants bring with them the seeds of disease. While measures have been taken for the better care of repatriated labourers arriving in Nyasaland no information is available of the thousands of returning emigrants who do not present themselves for examination.

Housing and Town Planning schemes and Food in relation to Health and Disease are subjects of comment (see this *Bulletin* 1938 Supp p 75*). Replies to the questionnaire on nutrition drafted by the Health Department and submitted to District Commissioners to Missions and certain educated Africans and to Medical Agricultural and Forestry Officers were analysed and the results tabulated and embodied in a Memorandum presented to and adopted by the Native Welfare Committee. This Memorandum appears as an Appendix to the Report under review under the title of *A Review of the Present Knowledge of Human Nutrition in Nyasaland*.

The scheme for the training of Africans had to be modified considerably owing to sickness among the nursing staff (see this *Bulletin* 1938 Supp p 78*). At the African Hospital Zomba provision is made for the training of various grades of African personnel male and female while at the Jeanes Centre the training of welfare community workers is undertaken.

Measures taken to spread the knowledge of Hygiene and Sanitation continued to be energetically implemented. *Recommendations and Proposals for Reorganization and Future Development of Health Services* are discussed at considerable length (see also this *Bulletin* 1938 Supp p 75*).

Port Health Work—The quarantine camp at Port Herald on the Berra Blantyre Railway continued to function during the year 71 Africans were detained for vaccination having been in contact with infectious disease etc.

Hospitals Dispensaries etc—At present there are six Hospitals each with 50 or more beds and nine with 30 beds. It is recommended that three of the 50-bed hospitals should be increased to 100 beds each with augmented staffs and equipment and that the 30-bed units might have accommodation reduced to 15 beds and be placed in the charge of African hospital assistants. Financial considerations render the construction of a new hospital at Zomba impossible. In the Northern Province the non-official European community provided the funds for the construction of a small cottage hospital at Lilongwe. Government will maintain and staff this unit. As regards native hospitals no new buildings have been erected nor have any additions been made to existing institutions. There is a growing demand from the Native Authorities for the provision of additional rural dispensaries. During the past two years upwards of 23 applications have been received for new dispensaries in some cases Native Authorities have provided the funds for the erection and maintenance of these units. The volume of work dealt with at hospitals and dispensaries during 1937 may be summarized as follows—

Race	Hospitals			Dispensaries Out-patients
	In-patients	Deaths	Out-patients	
Europeans	223	7	1,218	—
Africans and others	10,595	270	115,000	302,318

The commentaries upon general morbidity experience contained in the Annual Report under review are briefly referred to in the notes which follow.

Cases of malaria dealt with at hospitals and dispensaries totalled 16,774 the distribution by race and types of infection being as follows —

Type of Infection	Europeans		Africans and Others		Rural Dispensaries Out-patients
	In-patients	Out-patients	In-patients	Out-patients	
Benign tertian	6	11	62	180	—
Quartan	—	1	32	113	—
Subtertian	2	41	527	717	—
Cachexia	—	1	40	50	—
Blackwater	—	2	—	—	—
Undefined	10	82	354	3,702	9,729
Totals	28	138	1,031	4,831	9,729

There were 22 deaths among Africans due to malaria, and 2 cases of blackwater fever with 1 death among Europeans. The Government Entomologist has pointed out that although *A. costalis* is almost absent during the dry season it is overwhelmingly abundant during the late rains, while the other common species *A. funestus* shows no numerical increase during the year. He also found that the infection rate among *costalis* was very much higher than in *funestus*. The usual anti-malarial measures were successfully employed and it is reported that as a result the mosquito nuisance has been abated to a large extent in some areas.

At the Government Laboratory Zomba 1,379 out of 4,827 blood films examined were found to contain malaria parasites, the positive findings being *P. falciparum* 1,154 *P. malariae* 180 and *P. vivax* 36. The reports of the Medical Surveys (see above) present the results of blood film and spleen examinations at high and low altitudes in various areas.

Only 88 (non-fatal) African cases of smallpox were reported during the year 173,162 vaccinations were performed.

A somewhat serious epidemic of cerebrospinal meningitis occurred in the Southern Province and necessitated the promulgation of special rules under the Public Health Ordinance for the control of the movements of natives etc. The first case occurred in August and spread was rapid altogether 780 cases were reported and of this total 603 occurred in the Mlanje District. Dr W. T. C. BERRY the Medical Officer seconded for special duty in connexion with the epidemic contributes a detailed report which is presented as an Appendix to the Report under review.

Of relapsing fever 139 cases were notified. Of the total cases recorded 51 were dealt with in the Kota district alone where most of the cases gave a history of having slept in Government rest houses. The importance of having these rest houses constructed of vermin proof materials is emphasized. The Medical Officer Kota also reports among the results of his *Medical Surveys* in the area the carrier of relapsing fever is to be found in every hut.

Only one (non fatal) African case of enteric fever appears in the Hospital Returns but 1,538 cases of dysentery were treated during the year and of these 62 occurred among Europeans. The distribution of types of infection was (a) Europeans amoebic 56 undefined 6 and (b) Africans amoebic 150 bacillary 10 undefined 1,316. One European and 5 African deaths were ascribed to the disease. Among 1,398 faecal specimens examined at the Government Laboratory 88 were positive for *E. histolytica*.

Tuberculosis is considered to be increasing though it is not known even approximately what the incidence of the disease really is. Of the 251 cases reported during the year 145 patients were suffering from the pulmonary form of the disease. Out of a total of 252 Nyasaland native labourers repatriated from Southern Rhodesia during the year 39 were stated to have had tuberculosis and of these 35 were said to have suffered from phthisis. With a view to obtaining more accurate information concerning the incidence of the disease surveys were carried out in three areas and among 344 children examined by the dermal method using Moro's tuberculin ointment 31 gave positive reactions. It is said to be practically impossible to keep African patients in hospital for periods long enough to treat the disease effectively.

Of *trypanosomiasis* only two cases were reported—both from the Kota district. The medical Entomologist Dr W. A. LAMBORN reports that the steady retreat of the tsetse in a northerly direction continues. He estimates that the flies have vacated approximately 400 square miles of country since 1927. Dr Lamborn discusses the probable causes which have brought about the continued diminution of the numbers of flies and concludes that the decline must be due largely to the dearth of animal life on which the insects depend for their food. The opening up of large estates shooting organized hunts by natives etc. have all played their part in scaring game animals which have withdrawn to the Reserve in the North. A survey for parasites of the tsetse was commenced with a view to determining to what extent they may be responsible for the steady decline in the numbers of fly but first results suggest that parasites do not play an important part in bringing about the observed reduction.

Helminthiasis.—The following data relating to patients treated for helminthic diseases have been extracted from Hospital and Dispensary Returns—*ankylostomiasis* 12,242 cases *ascariasis* 2,231 *taeniasis* 161 *schistosomiasis* 7,487 and other helminthic diseases 342 giving a total number of 22,463 cases dealt with. [These figures refer to Out-patients only. It would appear that either in patient cases were first seen as out patients and not regarded as new cases if afterwards admitted to hospital or in patient cases have been omitted in error from the total in the Report under review. The text of the Report specifically states The total number of cases treated was 22,463. But in addition to the 22,463 out patients there were 1,845 non European in-patients and one European in patient.] The results of stool and

Race	Hospitals			Dispensaries Out-patients
	In-patients	Deaths	Out patients	
Europeans	223	7	1,215	—
Africans and others	10,545	270	113,669	302,318

The commentaries upon general morbidity experience contained in the Annual Report under review are briefly referred to in the notes which follow.

Cases of *malaria* dealt with at hospitals and dispensaries totalled 15,774 the distribution by race and types of infection being as follows —

Type of Infection	Europeans		Africans and Others		Rural Dispensaries Out-patients
	In-patients	Out patients	In-patients	Out patients	
Benign tertian	5	11	62	189	—
Quartan	—	1	32	113	—
Subtertian	2	41	827	717	—
Cachexia	—	1	46	50	—
Blackwater	—	2	—	—	—
Undefined	16	82	354	3,762	9,729
Totals	25	138	1,051	4,831	9,729

There were 22 deaths among Africans due to malaria, and 2 cases of *blackwater fever* with 1 death among Europeans. The Government Entomologist has pointed out that although *A. costalis* is almost absent during the dry season it is overwhelmingly abundant during the late rains while the other common species, *A. funestus* shows no numerical increase during the year. He also found that the infection rate among *costalis* was very much higher than in *funestus*. The usual *anti-malarial measures* were successfully employed and it is reported that as a result the mosquito nuisance has been abated to a large extent in some areas.

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urine examinations carried out in the course of *Medical Surveys* in various areas are presented in a series of tabular statements together with the commentaries of Medical Officers in charge of these investigations. The Medical Officer in charge of the survey of the North Nyasa District commenting on the high incidence of *schistosomiasis* in the area surveyed observes —

"In this marsh *B. africanus* is prevalent. *Lymnaea* were also found but in a search extending along the Lake shore from the River Songwe to Deep Bay (approximately 50 miles) I did not see a single *Planorbis*. It would appear that this mollusc is not the carrier of the disease in this district and another snail must be concerned.

In an Appendix to the Report under review Dr W. L. Gopsill contributes an interesting account of the incidence in this area under the title of *Some Observations on Schistosomiasis in North Nyasa District*.

At the Government Laboratory among 1 078 specimens of urine examined 219 contained evidence of bilharzial infestation, while the findings among 1 396 faecal specimens dealt with included *ancylostoma* 520 *ascaris* 27 *S. mansoni* 37 *E. histolytica* 88.

Of venereal diseases 3,324 cases were reported and of these 2,377 cases were of syphilis and 947 gonorrhoea. The out-patient clinic at Blantyre continued to function with fair success, but subsequent attendances following first visits for treatment were disappointingly few. It is noted that a native nurse was posted to the clinic and 145 female patients paid a first visit. At Denza among 1 433 labourers examined only 28 were rejected on grounds of venereal disease. The finding is interesting in view of the common belief that venereal diseases are increasing. Hospital and Dispensary Returns also show that 2,960 cases of yaws were treated during the year under review.

Leprosy—The treatment of the disease in Nyasaland is carried out almost entirely by the Missions with the financial aid of Government. There are 12 clinics established throughout the country, the majority of the centres being in charge of qualified nurses. "Approximately 646 lepers were under treatment at these clinics during the year 280 were admitted 96 were discharged, and 35 died. It is not known to what extent the disease is prevalent in Nyasaland, but it may be possible to obtain fairly dependable information during the course of the next census.

Among other diseases mentioned in the Report deficiency diseases were the subject of special investigation by the Medical Department, the results of the enquiry being embodied in a Memorandum presented to the Native Welfare Committee (see above *Public Health*). Five cases of rickets, 3 of scurvy, 5 of beriberi and 48 of pellagra were recorded during the year. Rabies is said to have caused anxiety and to have shown no signs of abatement, but no cases appear to have been recorded unless they have been included under the title *Injuries inflicted by animals* (bites, kicks, etc.)" Over 50,000 cases of ulcers among African patients and 43 781 cases of bronchitis were dealt with.

Scientific—The Report of the Government Pathologist is confined to a summary of the specimens received and examined at the Government Laboratory and findings recorded. Altogether 8 058 specimens were dealt with. The principal findings have been referred to in preceding sections of this summary. The Annual Report of the Medical Entomologist has also been quoted in the section *trypanosomiasis* above. In addition to the tsetse fly surveys, Dr Lamborn continued

his survey for rodents and their ectoparasites and his investigations of the breeding habits of *Tabanidae* and commenced a study designed to determine whether *Myxo tuberculosis* undergoes any morphological changes within the fly *Musca sorbens* and whether the organisms remain viable after they have been ingested by the fly.

Four Special Reports appear as Appendices to the Report under review viz —

- (1) Post-Operative Complications in the Natives of Nyasaland by Dr C H HOWAT
- (2) Cerebrospinal Fever in Nyasaland by Dr W T C BERRY (Reviewed in *Bulletin of Hygiene* 1938 Vol 13 p 867)
- (3) Some Observations on Schistosomiasis in the North Nyasa District by Dr W L GORSILL. (Reviewed above p 38)
- (4) The Native Welfare Committee Report on Nutrition. (Reviewed in *Bulletin of Hygiene* 1938 Vol. 13 p 981)

Three of these Special Reports have already been the subject of brief reference in the preceding notes. It remains to say that Dr Howat's contribution discusses four common complications of operation viz post-anaesthetic vomiting infection of the surgical wound retention of urine and pulmonary lesions—bronchitis pneumonia etc. His surgical practice in Nyasaland leads him to conclude that these complications are encountered rarely or not at all in the Protectorate.

Financial—Actual expenditure on Medical Department services during 1937 amounted to £51,322 as against an approved expenditure of £52,712.

P. Granville Edge

ZANZIBAR PROTECTORATE (1937)

Zanzibar Protectorate off the East African Coast comprises the islands of Zanzibar and Pemba and the islets within their territorial waters. Zanzibar is about 53 miles long by 24 miles broad with an area of 640 sq miles. Pemba to the north-east of Zanzibar is about 42 miles long by 14 miles broad. The only town of importance is Zanzibar Town.

Vital Statistics—Published figures are compiled from returns submitted by the *Mfidirs* through the Provincial Administration and in the words of the Report cannot be regarded as even approximately correct for registration is incomplete. The principal facts are given as follows —

Estimated Population	Registered Births	Birth Rate	Registered Deaths	Death Rate
243 135	4 199	17.0	4,026	16.9

The infant mortality rate for the year is not stated but it is observed that rates in specially defined areas in 1937 were 141 for natives and 159 for Indians per 1 000 live births. The maternal mortality rate

of 9.2 per 1 000 live births relates principally to the town of Zanzibar for the Protectorate as a whole it is believed this rate would be greatly exceeded. The investigations of the Welfare Clinic are being continued and it is hoped that by the end of 1938 sufficient data will have been assembled to provide reasonably dependable infant and maternal mortality rates.

European Officials resident numbered 110 with an average number resident of 70. One death was recorded. *Non European Officials* resident numbered 462, with an average number resident of 423. Five were invalided but no deaths were recorded in this group.

The most common causes of sickness amongst Europeans and Non European officials were *influenza malaria and diseases of the respiratory and digestive systems*.

Maternity and Child Welfare Work—The year 1937 saw the results of the first full year's work of the Lady Medical Officer and her staff (see this *Bulletin* 1938 Supp., p. 81*). During the year the 7,310 new patients registered at the special day clinics made 45,306 attendances for treatment. of special significance is the fact that the proportion of women in Zanzibar attending hospitals for treatment rose from 22 per cent. in 1935 to 40 per cent. in 1936 (when the clinic started) and to 59 per cent. in 1937. In the Pemba Hospitals where there is no woman doctor the proportion of women patients has remained roughly constant at 23 per cent. The striking success of the venture in Zanzibar will be followed by the appointment of a second woman doctor in 1938 with extension of similar activities to the island of Pemba and to rural areas in the Protectorate when financial resources permit. Meanwhile at the hospitals at Chake Chake and Wete in Pemba a start has been made by providing women's out patient departments separated as widely as conditions permit from the men. In commenting upon these new departures and of the success of the initial venture in Zanzibar Dr W Leslie Webb Director of Medical Services quotes from the memoirs of one of the daughters of the first Sultan of Muscat and Zanzibar and published in 1880 in which the enlightened lady observed that if a "female physician could be brought to undertake service in Zanzibar she would be able to do more good than ten medical men combined."

At the three *Infant Welfare Clinics* held weekly attendances totalled 3 612, and at the *Ante Natal Clinic* 847. During the year under review cases of *diseases of the puerperal state* dealt with in Government Hospitals numbered 302 as compared with 115 in the preceding year. Clinics were also actively functioning during the year at four rural dispensaries with encouraging results.

The *Zanzibar Maternity Association* is no longer under the control of the Medical Department (see this *Bulletin* 1937 Supp., p. 70* and 1938, Supp. p. 81*) and returns of the work of that organization will no longer be included in the Annual Medical Report.

School Hygiene—A most satisfactory feature of the year's work was the extension of the School Medical Service. During 1937 over 1 600 children were medically examined and nearly 1,300 were seen by the Dental Surgeon—the largest numbers of school-children ever dealt with in a single year in the Protectorate. The service is well established in both islands and fewer difficulties are met with, for examinations are willingly accepted by both parents and children. The results of these examinations are set out in considerable detail in the Report under review but for present purposes it must suffice to summarize

briefly the principal findings. In both Zanzibar and Pemba *malnutrition* is grossly evident amongst rural African children less so among rural Arabs the town-dwelling African child is better nourished than his rural contemporary but is less well fed than the town Arab child. Malnutrition is less evident amongst pupils at the Government girls school than amongst male children. With one or two exceptions the cleanliness of school-children leaves much to be desired—*scabies* is common in the rural schools owing to the filthy condition of the cotton garments worn by pupils. In all schools *dental caries* is very common—about 92 per cent of the pupils showing defects. Pathological eye conditions were frequently met with being most common in areas where malnutrition is evident. *Arkylostomiasis* is said to be universal in the rural areas with *ascariasis* common in the southern area in schools on the east side of the island of Zanzibar. Treatment for diseases met with amongst school-children is regularly carried out but for *ankylostomiasis* results have not proved so encouraging owing to the frequency with which re infestations occur. Lectures on health subjects are given to school-children special attention being devoted to talks on the dangers of hookworm and malaria *scabies* etc. and how these diseases may be avoided.

Public Health Sanitation etc—Dr W Leslie WEBB observes Adequately trained native staff still remains one of the crying needs of the department and it is difficult to see how any material extension of service can be effected without considerable cost until it is provided. In 1935 Government approved a scheme for the formation of a Zanzibar Native Medical Service through the framework of a rural Africans could be given a comprehensive training in medical work with a view to subsequent absorption into the Department as rural dispensers nurses and midwives. However at that time there were no rural Africans of the required educational standard available for training though subsequently with the co-operation of the Education Department arrangements were made for the further general education of a number of boys and girls the first of these classes of boys will be available for Medical Department training in 1940 and of girls in 1942.

The anti-malarial survey conducted by Dr D D McCARTHY (see this *Bulletin* 1938 Supp p 84*) under a grant from the Colonial Development Fund was completed in September 1937 and it is expected that his Report will be published early in 1938. Preventive measures continue to be actively carried out along the lines described in previous issues of this Supplement.

Present-day methods of sewage disposal were described in earlier Reports and referred to in this *Bulletin* 1937 Supp p 72* and 1938 Supp p 82*. The posting of three locally trained African Sanitary Inspectors for permanent employment to rural areas in connexion with a scheme for providing *dore-kole latrines* for the whole population in those areas marks the first serious attempt to cope with the problem of rural sanitation. Scavenging services are ample and satisfactory for the removal and disposal of refuse continued along lines previously described.

In Zanzibar water supplies were reasonably satisfactory but in Pemba water-mams are laid but in the native town the population have to employ water carriers to bring water to their houses. The supplies to Chake and Wete were reasonably satisfactory but in Mkoani water is of poor quality and insufficient in quantity. The

of 9.2 per 1 000 live births relates principally to the town of Zanzibar for the Protectorate as a whole it is believed this rate would be greatly exceeded. The investigations of the Welfare Clinic are being continued and it is hoped that by the end of 1938 sufficient data will have been assembled to provide reasonably dependable infant and maternal mortality rates.

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Public Works Department have carried out experimental borings and it is expected that the present unsatisfactory conditions will shortly be remedied. In rural areas water is still obtained from deep and shallow wells and from rivers. Sanitary Inspectors are required to supervise and endeavour to improve supplies in such areas.

Under the heading of *Housing and Town Planning* a somewhat detailed account is provided of general conditions and of attempts to bring about improvement so far as urban housing is concerned in Zanzibar and Pemba. Numerous surveys and inspections of properties brought to light many cases of unsatisfactory housing and steady pressure was maintained to persuade or enforce owners to effect necessary improvements. Rural housing conditions did not alter during 1937. It is said that though on the whole rural housing is not good there is little overcrowding.

As regards *foods etc.* it is stated that the publication of a *Nutritional Review of the Natives of Zanzibar* early in the year served to focus attention on the subject for it was clearly demonstrated that native dietaries are invariably lacking in some essential foodstuffs to the detriment of the health of the people. The implementation of the recommendations made for the improvement of existing conditions must be a matter of time and governed largely by financial considerations (see also this *Bulletin* 1937 Supp. p. 72* and 1938 Supp. p. 83*).

Training of Native Personnel—A notable advance in the training of non-European personnel was made when the systematic training of nine learner Sanitary Inspectors (Indian, African, and Goan) culminated in their examination under the auspices of the Royal Sanitary Institute: five satisfied the examiners. The training scheme is the first of its kind to be undertaken in East Africa. The training of *rural dispensers* was continued as usual.

Measures taken to spread the knowledge of hygiene and sanitation included lectures by Sanitary Inspectors to school-children and the general population; the distribution of pamphlets devoted to explaining the meaning of simple health precautions; lectures by Medical Officers, Health Exhibitions, etc.

The Annual Report of the Dental Surgeon is printed as an Appendix to the Annual Medical Report under review. It is stated that after four years of observation of the natives of Zanzibar Protectorate, it is safe to affirm that over 90 per cent. of them suffer from dental disease. The Report comments at some length on oral conditions in the Protectorate, discusses dental work carried out among school-children and supplies tabulated facts relating to the numbers of schools visited, pupils examined, etc.

Port Health Work—During the year 539 ships and 712 dhows entered the harbour and 1,531 immigrants landed. Routine services were carried out as usual and nothing unusual in respect of Port Health work is reported.

Aeroplane traffic accounted for the arrival and departure of 347 planes carrying 384 immigrants and 267 emigrants. All aircraft arrive from Kenya or Tanganyika: no quarantine restrictions of any kind are imposed and so far do not appear to be called for.

Hospitals, Dispensaries, etc.—The numbers and distribution of Hospitals and Dispensaries in the Protectorate may be conveniently set out in the following manner:—

Locality	Hospitals	Special Clinics	Dispensaries	Total
Zanzibar Island — Town District	6	2	2	10
Pemba Island — Town District	2	—	18	20
— — — District	3	—	—	3
— — — District	1	—	—	8
Totals	12	2	28	42

The above figures include one European hospital and a Mental Hospital in Zanzibar Town, a Poor Home and a Leper Colony in Zanzibar District and a Leper Colony in Pemba Island District.

At these institutions 4,673 in-patient were admitted during the year in patient cases treated totalled 121,347 and among them 449,370 attendances were recorded. Out patients dealt with numbered 219,396 and attendances at Dispensaries. Mention has already been made of the extension of medical facilities in the interests of women (see *Merchandise* above) and of the proportions of value throwing any light on the incidence of disease in the Protectorate are the returns compiled at Government Hospitals and Dispensaries. The following notes briefly summarize the principal references contained in the Report and returns to disease incidence during 1937.

Malaria patients treated at Government Hospital etc numbered 8,801 and of these 249 were in-patient (7 died) and 8,552 were out patients. The distribution of types of infection among in-patients reads *benign tertian* 28, *quartan* 1, *tertian* 123 and unclassified 97. The corresponding figures for out patients being 457, 22, 1,797 and 6,276 respectively. There were also 5 cases of *blackwater fever* two of these being treated as in-patients. At the Pathological Laboratories Zanzibar and Pemba the following blood films were examined and findings recorded —

Laboratory	Blood film	Positive findings			
		<i>P. vivax</i>	<i>P. falciparum</i>	<i>P. malariae</i>	Undefined
Zanzibar	9,378	253	1,252	26	533
Pemba	2,015	446	339	—	103

P. vivax and *P. falciparum* were found together in 22. Reference has been made in the section *Public Health* above of anti-malarial control measures and of the special survey completed in 1937.

No case of any of the dangerous infectious diseases was recorded (see this *Bulletin* 1938 Supp. p. 84*). During the year 8,805 anti-smallpox vaccinations were performed in Zanzibar and 1,918 in Pemba. One case of *relapsing fever* was reported but as *O. moubata* is not known to exist in Zanzibar or Pemba it is certain the disease must have been contracted outside the Protectorate. One fatal case of *cerebrospinal meningitis* was notified from Wete in Pemba.

Of the 2 cases of enteric fever notified 20 occurred in Zanzibar Town. At the Zanzibar Laboratory 18 out of the 113 samples of serum agglutinated *Bact. No. 2000*. Dysentery was responsible for 56 cases and of these 38 occurred in Zanzibar. (Hospital Returns record 61 cases of which 8 were amoebic, 24 bacillary and 31 unclassified.) Among 142 faecal specimens examined *B. et dysenteriae* Flexner was isolated in 26 and Sonne in 6.

During the year 214 patients were treated for tuberculosis (all forms) and of this total 182 were suffering from the pulmonary type of the disease. 45 of the 48 deaths were due to phthisis. New cases notified nearly all of the pulmonary type numbered 151 and of these 123 were in Zanzibar Island. The year's figures for the Walezo Tuberculosis Asylum were total treated 94, died 33, discharged 39. There were also 6454 cases of bronchitis and 204 of pneumonia.

New cases of leprosy notified numbered 28 and the total cases treated 137. The two Leper Colonies at Walezo in Zanzibar and Makondeni in Pemba are well patronized by lepers who enter and reside there voluntarily (see this Bulletin 1938 Supp. p. 84*).

Helminthic diseases—Hospital Returns show that 12,202 cases of ankylostomiasis were dealt with during the year. The view is expressed that there can be no doubt that nearly the whole population of the island of Zanzibar is infected with hookworm. In an attempt to discover to what extent the application of proved methods of control is applicable in Zanzibar Government is to provide sufficient latrine accommodation in a selected area and by the end of the year six boring machines were at work in the area under the charge of three African Sanitary Inspectors. Efforts are being made to popularize the use of latrines by constructing portable latrines and providing cement tops free of charge at a cost to Government of 4 shillings each complete latrine and if the experiment proves successful it is hoped to apply the principle to the whole Protectorate. Schistosomiasis is said to be widespread in Pemba but less evident in Zanzibar. Intestinal forms of the disease are rare. During the year 576 cases were treated. An investigation of the problem was undertaken by a research worker from the London School of Hygiene and Tropical Medicine and by the end of the year the snail carrier had been incriminated, and the fact ascertained that its distribution in the Protectorate is limited by certain definite factors. In the light of these discoveries it is hoped that measures may be devised for the complete eradication of the disease. At the two Laboratories the following findings were recorded following the examination of specimens of faeces and urine—

Item	Laboratory	
	Zanzibar	Pemba
Faecal specimens examined	6,328	863
Positive findings—		
Ankylostoma	2,508	408
Ascaris	483	29
Trichuris	94*	46
S. mansoni	5	—
Urine examined	499	813
Positive findings—		
Schistosoma	16	129

Venereal Diseases—During the year 1192 cases of syphilis 1465 of gonorrhoea 65 of soft chancre and 4168 of warts were treated. It is stated that the figures for gonorrhoea give no idea of the incidence for almost every adult has the disease (see this *Bulletin* 1938 Supp. p. 85*). At the Zanzibar Laboratory the Kahn test applied to 4210 samples of serum gave 681 positive and 592 doubtful reactions.

Other diseases referred to in the Report included the following. It is said that *filariasis* occupies a prominent position amongst diseases affecting natives. For *ulcers* 21,973 cases were dealt with. Among the 3354 *diseases of the eye* treated were 93 cases of *trachoma*. Cases of *influenza* numbered 1068 all were of a mild type and no deaths were reported.

Scientific—The Laboratories at Zanzibar and Pemba continued to function as heretofore and references to the work and findings recorded have been made under various headings in the preceding note. During the year the following paper was published—

VASSALLO (S. M.) Duodenal Ulcer in Zanzibar—*East African Med. J.* 1937 Vol. 14 No. 3

Financial—Total expenditure on Medical Department Services amounted to £48,204 a sum which represents 9.7 per cent of the total revenue of the Protectorate.
P. Granville Edgè

different States from 35.5 in Cojedes to 0.6 in the Federal District. The former figure would appear to be of doubtful accuracy for in the account of observations made in San Carlos a small town in Cojedes we read that the diagnosis malaria had been inserted on a large number of death certificates of cases of which the cause of death was completely unknown. For Venezuela as a whole the marked reduction which characterized malaria mortality recorded in 1936 and 1937 is explained by the fact that in those years malaria deaths certified by a doctor were alone taken into consideration.

The report gives details of observations made in places in 15 of the 22 States. A few of the surveys were fairly complete and the report describes the measures that have been adopted to control the disease. As examples of the diversity of malaria conditions may be cited observations made in Barcelona and Maracay. Barcelona, the capital of Anzoategui (pop. 11497) on the river Neverí, 3 kilometres from the sea suffers severely in certain years. The months of maximum prevalence are from October to April, which coincide with the seasonal prevalence of *A. albimanus*. Three-quarters of the cases are *falciparum* infections. In Maracay, an important agricultural and industrial town 445 metres above sea level, malaria is an important cause of mortality in certain years. There is a well marked five-year cycle. Here May to October are the months of maximum prevalence and *mix* infections preponderate. *A. pseudopunctipennis* is the anopheline most in evidence during the malaria season.

Attached to the Central Office of the Division of Malariology is a laboratory and a school of malariology. Thirteen doctors and 23 fifth-year students attended the first course. The staff of the Division during the year examined 68,531 persons, visited 22,071 breeding places, and classified 21,126 adult mosquitoes and 222,543 larvae.

Norman White

TROPICAL DISEASES
BULLETIN.

Vol. 36]

1939

[No. 2.

SUMMARY OF RECENT ABSTRACTS

II YELLOW FEVER*

Epidemiology

JAMES (p. 110) gives a table of 111 cases with 84 deaths in South America and Africa during the 6 months ending 31st March 1937 and a similar table (p. 486) of 349 cases with 297 deaths during the 9 months ending 30th September 1937. The latter is an increase over the numbers recorded in the previous year.

Flu (p. 116) thinks that an atypical usually unrecognized form of the disease exists endemically in Surinam and that it flares up in epidemic and typical form with the incursion of considerable numbers of susceptible persons. The evidence for this opinion is given. Only the existence of a comparatively innocuous virus and maintenance of the disease in atypical form during non-epidemic periods can explain why natives and whites who have lived long in yellow fever lands do not suffer severely during epidemics. This view is supported by further evidence —

PELTIER, DURIEX and MARTIN (p. 115) consider that an epidemic in French Guinea in 1932 supposed to be of influenza but with a mortality of 1,540 in 8,600 cases was probably actually due to yellow fever. Their evidence includes the results of protection tests preceded by a rise in the death rate among local Africans in Nigeria not being then suspected. In a survey in French Equatorial Africa STEFANOPOULO (p. 114) found that a number of sera gave positive protection tests. [The figures are as follows — Middle Congo 277 sera tested with 59 positive of which 104 with 19 positive were from children under 15. Gabon region 272 sera tested with 33 positive of which 95 with 10 positive were from children under 15. Tchad region 129 sera tested with 37 positive of which 115 with 36 positive were from children under 15.] These positive results in children indicate that the disease must still be present. Investigations added further support to the view that the test is sufficiently specific to be of value in determining the distribution of yellow fever

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1933 Vol. 35. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed (p. 10).

In the Lower Congo VAN DER BERGHE (p. 491) found 14 positive sera in 114 collected from children. JAMES (p. 487) records that in Kordofan 70 to 80 per cent. of the inhabitants show yellow fever immune bodies in the blood.

SOPER (p. 114) concludes that the reported incidence of yellow fever is no safe index of its occurrence in endemic zones and that there is a vast silent reservoir of infection in the interior of South America. It extends to many districts in which *Aedes aegypti* does not exist. HANSON (p. 487) reports an outbreak in Peru apparently of the jungle type with a high mortality. *Aedes* is absent from the infected area.

OHLEWICH (p. 488) shows how an epidemic was started in northern Chile by the introduction of a case into a hospital where mosquito nets were little used. The epidemic (of more than 100 cases) was controlled by anti-mosquito measures.

SOREL (p. 111) describes a missionary who had lived for 30 years in Africa, sometimes in the midst of epidemics of yellow fever. During this time he had never had any attack indicative of yellow fever. He then left and stayed for a year in Paris but within a month of returning to the French Sudan he contracted the infection and died of it.

Aetiology

DURIEUX (p. 495) states that the injection of patients' blood into the brains of mice affords a method of certain diagnosis on condition that the nature of the isolated virus is confirmed by protection tests with yellow fever immune serum. Thirteen strains were isolated in this manner. He considers that in human yellow fever under the influence of the bile in the serum, the virus loses its viscerotropic but preserves its neurotropic properties for longer periods. Certain strains are much more virulent than others. Virus was found to persist in the blood of yellow fever patients up to the 5th day of fever (See below vaccination).

SMITH (p. 496) found that mouse testis seems to be quite as suitable as mouse brain for the isolation of virus.

ROUBAUD, STEFANOPOULO and FINDLAY (p. 124) found that a culture virus kept for long periods either in mouse embryo tissue and then fowl embryo tissue or in the latter alone was not transmissible by the bites of mosquitoes.

WHITMAN (p. 122) titrated the virus present in *Aedes* at various intervals after infection. The virus content falls during the first week and then increases rapidly to a higher level than at first. Multiplication therefore takes place. (For this author's experimental work on *Aedes* larvae see later Research.)

Transmission

WHITMAN and ANTUNES (p. 490) found that *Aedes scapularis* and *Aedes fluviatilis* are efficient vectors. *Aedes nubilus*, *A. terreus*, *Mansonia jansoni*, *M. fasciolata*, *M. chrysotum* and *M. albicosta* failed to transmit but the virus was retained in their bodies for long periods. Certain races of *Psorophora ferox* may be capable of transmission. ROUBAUD, COLAS-BELCOUR and STEFANOPOULO (p. 117) show that *Aedes gemscutatus* is an efficient carrier.

WHITMAN and ANTUNES (p. 489) demonstrated the transmissibility of two strains of jungle yellow fever by *Aedes aegypti*. This is interesting in view of the fact that the virus seems rarely to be introduced into towns harbouring this mosquito possibly because patients in outlying

districts (jungle) are not brought into towns within the period of their infectivity (the first 3-4 days of illness). But that it may be seen in the small outbreak at Cambará Paraná recorded by WILCOTT *et al* see below (Prevention). The strains used were the M.A.J. and Suarez strains and the incubation period found was 14 or 15 days much longer than for the Asibi (urban) strain. This long incubation period may play a part in limiting the importation of jungle virus into towns since a greater proportion of infected insects would die before becoming infectious. Some of the rhesus monkeys infected showed delayed febrile response and at the time of fever virus had practically disappeared from the blood stream. If the human response is similar many cases brought to towns for treatment would be no longer infectious for local *Aedes* which would limit the frequency with which jungle virus might invade urban centres.

ARTURUS and WIRTHS (p 491) found that *Haemagogus janthinomys* retained the Asibi strain of virus for at least two weeks and *H. tritaeniorhynchus* the M.A.J. strain (of jungle fever virus) for 16 days. Transmission however was not produced.

VATHIS (p 117) compared strains of *Aedes aegypti* from widely different countries. Cross fertilization can be effected and the species is very homogeneous in all parts of the world. Three years previously Mathis had tried without avail to discover whether there were distinct races of *Aedes aegypti* comparable with what is known to exist in the case of *Anopheles maculipennis*. *Aedes aegypti* is therefore a serious potential danger as a carrier of yellow fever in any country.

THE BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE (p 113) gives the *Aedes* index for various African countries. It is prevalent throughout East and West Africa. JAMES (p 486) shows that in a small epidemic in Accra there was a low *Aedes* index in houses but breeding was taking place freely in abandoned wells.

VACCALUM and FINDLAY (p 125) found that 22 out of 92 African monkeys showed immune bodies. In view of the essentially domestic character of *Aedes aegypti* under natural conditions other mosquitoes must be regarded as potential vectors. 175 cattle and 70 sheep from Kenya were examined, with 13 and 3 respectively positive. The possibility of their having been exposed to infection cannot be excluded. Certain wild rodents and animals in West Africa were entirely negative. But it is also possible that virucidal properties may appear in cattle under certain physiological conditions or as a result of bacterial or virus infections other than yellow fever since in Uganda where there are few human positive sera the proportion in cattle is high and in the Gold Coast the reverse is the case.

JAMES (p 111) quotes FINDLAY's observation that 20 out of 88 monkeys caught in endemic areas in Africa gave positive protection tests while the sera of monkeys from Kenya, India and Java were negative. The specificity of the protection test using cattle sera is doubtful.

Pathology

HOFFMANN (p 119) claims that the most reliable and quickest method of diagnosis in early epidemic cases in countries with latent endemic infection is the histological examination of post-mortem material. BARTER and BROCK (p 491) state that specific lesions can only be found in the liver. They also note that intranuclear inclusions in the liver cells when they can be demonstrated clinch the diagnosis.

occurred in patients inoculated with two of several pools of monkey sera used with the virus.

PELTIER, DURIEX JONCHÈRE and ARQUIÉ (p. 494) found that serum containing bile neutralized yellow fever virus completely in four hours, provided that the jaundice was total. Bile salts are necessary for this phenomenon. The virus is probably not killed but only coated. Virus treated in this way has been used for vaccination. The serum of patients with total jaundice may thus give positive protection tests. It appears that brain tissue is necessary for this phenomenon since if phosphatic suspension of infected mouse brain or virus present in Seitz filtrate are used, the bile destroys the virus completely.

SOREL (p. 111) quotes a patient who had been vaccinated against yellow fever by three inoculations in August-September 1934. She became ill on 2nd October 1936 and died of typical yellow fever on the sixth day. A specimen of her serum collected at the beginning of the attack was found to be no longer protective. It therefore appears to be necessary to vaccinate at intervals of 18 months or even every year. BIZIEX and DESROS (p. 117) report a patient who died of yellow fever although vaccinated 19 months previously with three doses of Laligret's vaccine.

Research

SOPER, BEEUWES, DAVIS and KERR (p. 496) show that antibody present in the serum of babies depends on its presence in the serum of the mothers. This initial immunity present at birth seems to be entirely passive and disappears usually within three months. The influence of maternal immunity on the results of protection tests in children may be disregarded after 12 and probably after 6 months.

SELLARDS and BENNETT (p. 123) showed that 20 per cent. suspensions of mouse brains infected with the French neurotropic strain in physiological saline containing 1 per cent. phenol lost virulence completely after being kept at 37°C. for six days. Nevertheless, used as a vaccine this gave some protection to mice: 21 out of 35 surviving, whereas 29 out of 31 controls died. Addition of cysteine to this vaccine augmented its efficiency probably by restoring some of its lost antigenic power.

WHITMAN and ANTUNES (p. 489) found that *Aedes aegypti* infected in the larval stage retained virus on emerging as adults especially if the concentration of virus in the fluid in which the larvae were placed was high, even if the larvae were transferred to clean water after a few hours contact with virus. Attempts to transmit virus through eggs were uniformly negative.

NICOLAU and BAFFET (p. 119) and STREFAKOPOULO, NAGAKO and WASSERMANN (p. 497) have investigated the susceptibility of various animals to yellow fever virus.

C II

TROPICAL DERMATOLOGY

A REVIEW OF RECENT ARTICLES I *

99

Blasomycosis—Once again the majority of publications have been concerned with chromoblastomycosis. CARRIÓ and PIMENTEL¹ describe the first case to be recognized in the Dominican Republic. The patient was a male native labourer aged 60 in whom the disease had started some 20 years earlier whilst he was working barefooted in a tuber plantation. At that time a small wart appeared on the right external malleolus. This gradually spread until a diffuse thick swelling involved the whole of the outer side of the foot. A superimposed tumour was well defined but had an irregular and polycyclic border. It extended from the external malleolus round the tendo Achillis nearly to the internal malleolus. The centre of this mass was slightly depressed and violaceous consisting of scarring and some scattered warts. Its edge was raised 8 mm above the surrounding skin and was lobulated and papillomatous with some slight scaling and crusting. A full description is given of the cultures and microscopical appearances of the organism. This was of the *Hormodendron pedrosoi* type but exhibited a slower rate of growth and unusual length of the conidia and a variability in the production of aerial mycelium. The case reported by GOMES² is interesting in several ways. A white Brazilian aged 51 cut his hand on the branch of a eucalyptus tree. This wound healed in a month under dressings with hydrogen peroxide but vesicles appeared in the scar eight days after apparent cure. These were sharply defined and gradually acquired a verrucous surface. X-rays demonstrated osteoporosis of the first and second phalanges of the left hand. Details are given of the first and experimental inoculation the author succeeded in infecting guinea pigs rats and rabbits. It is claimed that this constitutes the first experimental reproduction of the disease. The same fungus was isolated from the offending tree branch. In Java MÜLLER ESSED and HAZEBOEK³ detected the disease on the left buttock of a 60-year-old native. There was no history of antecedent trauma but this might be negated by the fact that three years had elapsed since the lesion had first been noticed. The fungus was proved to be *Trichosporon pedrosoi*. The article is well illustrated. MARTIN⁴ has published the

* For the fourth of this Series see Vol. 35 pp. 89-94
¹ CARRIÓ (A. L.) & PIMENTEL INBERT (M. F.) Chromoblastomycosis in the Dominican Republic.—*Puerto Rico J. Public Health & Trop. Med.* 1933 June Vol. 13 No. 4 pp. 522-530 With 5 plates. [Spanish version pp. 531-539]

² GOMES (J. M.) Chromoblastomycosis caused by a Fungus of the Genus *Hormodendron*.—*Arch. Dermat. & Syph.* 1933 July Vol. 38 No. 1 pp. 12-18. With 4 figs.

³ MÜLLER (H.) ESSED (W. F. R.) & HAZEBOEK (F. E. A.) Een geval van chromoblastomycose in Oost Java.—*Genesek Tijdschr. v. Nederl. Indis* 1937 Dec. 21 Vol. 77 No. 51 pp. 3259-3263. With 10 figs. on 2 plates. English summary (4 lines)

⁴ MARTIN (Donald S.) The Antigenic Similarity of a Fungus *Cadophora americana* Isolated from Wood Pulp to *Phialophora verrucosa* Isolated from Patients with Dermatitis Verrucosa (Chromoblastomycosis).—*Amer. J. Trop. Med.* 1933 July Vol. 18 No. 4 pp. 421-428 [10 refs.]

TABLE 1.—Clinical and Biologic Differentiation of *Coccidioides immitis* in vivo in and *Paracoccidioides brasiliensis* (North American South American and *Histoplasma*)

Disease	Parasite	Clinical Characteristics	Biologic Characteristics	Immunologic Characteristics	Pathologic Characteristics	Other Characteristics
Coccidioidomycosis (Pitt-Rivers disease, 1906) (Richardson and Chubb, 1934) (Richardson and Chubb, 1934)	<i>Coccidioides immitis</i>	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.
North American blastomycosis (Pitt-Rivers disease, 1906) (Richardson and Chubb, 1934)	<i>Blastomyces dermatitidis</i>	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.
Paracoccidioidomycosis (Pitt-Rivers disease, 1906) (Richardson and Chubb, 1934)	<i>Paracoccidioides brasiliensis</i>	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.
South American blastomycosis (Pitt-Rivers disease, 1906) (Richardson and Chubb, 1934)	<i>Blastomyces dermatitidis</i>	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.	Localized cutaneous lesions, with lesions of the face, neck, and chest, and with lesions of the respiratory system, may be localized or generalized, with or without dissemination.

results of his work on antigens. Seven species of *Cadophora americana* obtained from the United States were compared with specimens of *Phialophora verrucosa* procured from patients in Texas, Uruguay, North Carolina, Porto Rico and South America. The experiments were carried out on rabbits and it was found that one type of *Cadophora* isolated from wood pulp gave results very closely approximating to those obtained with *P. verrucosa*. The remaining six species differed very widely from these both antigenically and morphologically. The importance of a paper published by MOORE* lies chiefly in its extensive pathological work for the references to clinical features are but brief. It deals with blastomycosis, coccidioid granuloma and paracoccidioid granuloma and is a comparison of North American and South American and European types. The chief differences are most easily appreciated by a reference to the accompanying table which is reproduced from his well illustrated article.

Coccidioidosis—Studies of the metabolism of *Coccidioides immitis* (Stiles) are published by STEWART and MEYER*. The organism is resistant to desiccation but the chlamydospore develops under conditions of drying. It is apparently impossible to infect animals in the absence of this spore. It therefore seems probable that this resistance to drying is an important factor in the dissemination of the organism in the San Joaquin Valley of California. They have devised a synthetic medium which possesses selective properties of great value in the isolation of the organism from soil and clinical material. This consists of distilled water containing 1 per cent ammonium phosphate, 1 per cent sodium acetate, 0.2 per cent acid potassium phosphate, 0.2 per cent potassium phosphate and 0.01 per cent magnesium sulphate. There are no significant differences of metabolism shown between specimens grown in the above medium and those grown in a protein rich medium. Glucose is assimilated by *Coccidioides* and by blastomycetes. This change does not suppress the production of ammonia but even favours it, a fact which shows a great difference between the metabolism of these organisms and that of bacteria and certain protozoa. The authors lay great stress on the fact that fungi require their own types of media. Such should be chemically defined so that they can form a common denominator allowing exact correlation of results reported by investigators in different countries.

Maduromycosis—The fourth case to be reported from North America is described in great detail by HANAN and ZURETT*. The patient was a male Hindu who had been born near Delhi but who had lived in the United States for 18 years. In 1933 when aged 36 a splinter entered the dorsum of the left foot when he kicked a piece of old wood. The wound healed rapidly but six weeks after the accident swelling appeared at the site. This gradually increased but ulceration did not appear until two years later. This story is partially

- * MOORE (Morris). Blastomycosis, Coccidioid Granuloma and Paracoccidioid Granuloma. Comparative Study of North American, South American and European Organisms and Clinical Types.—*Arch. Dermat. & Syph.* 1938 Aug. Vol. 38, No. 2, pp 163-190. With 11 figs. [45 refs.]
- STEWART (R. A.) & MEYER (H. F.). Studies in the Metabolism of *Coccidioides immitis* (Stiles).—*J. Infect. Dis.* 1938 Sept.-Oct. Vol. 63, No. 2, pp 186-205. With 2 graphs. [22 refs.]
- HANAN (Ernest B.) & ZURETT (Sophia). A New Species of *Madurella* Isolation and Identification in a Case of Maduromycosis.—*Arch. Dermat. & Syph.* 1938 June Vol. 37, No. 6, pp 847-868. With 11 figs.

confirmed by the fact that the man was in hospital in 1892 for bronchitis and no foot lesion was present at that time. On examination a mass measuring 4×5 cm. was found on the dorsum of the left foot. It felt like a multilocular cyst and was freely moveable except at one point where it was attached to the epithellum. At this point the skin was thickened, hyperpigmented and eczematous. The whole was excised and the mass was then found to consist of encapsulated cysts each measuring 5 mm. in diameter. Each contained a dark brown serous fluid with some black grains in the centre. These grains were turned red by nitric acid. Excellent pictures illustrate the pathological investigations, as a result of which it is claimed that a new species has been isolated. It is proposed to use the name *Mladurella lackawana* the descriptive adjective being borrowed from a locality near Buffalo. The mycelium is white or smoky gray with a white periphery in old cultures. The colony tends to be spherical with a central mycelial zone and a peripheral zone. Growth is successful only on Sabouraud's dextrose agar and glycerine agar when enriched with liver infusion. The hyphae vary in dimensions from 1 to 5 microns and are coarsely granular. Septums are rare in early cultures but definite fine septums with smoky gray mycelium appear in later cultures at room temperature. Chlamydospores appear early in the spore zone. There are nodular organs consisting of arthrospores with square-cut ends in the peripheral mycelium late at room temperature. The optimal medium is fresh liver or liver infusion—Sabouraud's dextrose agar. The optimal temperature is between 20° and 37°C . The organism does not liquefy gelatin, digests milk protein, does not ferment milk lactose and does not digest milk fat. Pigment formation is abundant but blackening of the medium is more pronounced at room temperature except on glycerine agar enriched with liver. There is little or no growth on fluid mediums. Animal inoculation gives negative results. The first case in which the disease has apparently been contracted in the Dutch East Indies is described by BOERS, KOUWENAAR and WOLFF*. Actually too it is only the fourth case to be reported in that area. The man was a Punjabi who had lived on the east coast of Sumatra for 20 years. The total history covered only 12 months. The fungus was of the black grain variety and closely approximated to the descriptions of *M. americana*. Treatment was successful after eight months intravenous injections of sodium iodide. In all, 50 were given each consisting of 25 cc. of a 10 per cent. solution.

Piedra—The black variety is common in Cochin China and SOUCHARD and NGUYEN VAN HUONG[†] found large numbers of Annamese to be affected. The nodosities are very black and very hard, measuring 1 to 2 mm. in length and 300 to 400 microns in diameter. Both shape and size were however somewhat irregular. Whilst it appears that the organism has not hitherto been detected in this part of the world it would seem to be identical with the Brazilian black piedra in all respects, clinically macroscopically microscopically and in culture.

* BOERS (E. R. J.), KOUWENAAR (W.) & WOLFF (J. W.) *Mycotoma podis* (Mladurevort) — *Geslacht Tylachia v. Nederl. Indië* 1938. July 8 Vol. 78 No. 27 pp. 1808-1813. English summary.

SOUCHARD & NGUYEN-VAN-HUONG. La piedra noire de Cochinchine.—*Ann. Parasit. Humaines et Comparée*. 1937 Nov 1 Vol. 16, No. 6, pp. 539-543. With 3 figs.

Ringworm infections—GONAR¹⁰ has analysed 300 cases of scalp infection. All occurred in Egyptians two-thirds of them living in Cairo and the remainder in the neighbouring villages. There were 176 cases of favus all being caused by *A. schoenleini*; the most common incidence being between the ages of five and eight. There were 119 cases of *T. violaceum* infection usually occurring between the ages of five and ten; this disease was rather more common in the town whilst favus cases were more common in the country districts. All the *A. schoenleini* cases ran a shorter course than did those of favus by its absence pustules were chronic and the crater was remarkable lesions. There were four instances of infection by *M. canis* whilst *T. tonsurans* was only found on one occasion. Boys (179) outnumbered girls. A similar investigation has been carried out in Batavia by BOEDYN and VERBURGH who have studied the material obtained from 106 cases during 1936. They only succeeded in getting 42 positive cultures and of these but 10 were uncontaminated. These ten are described in great detail and at least two new species are claimed among them. One fungus which was found in crown lesions they propose to call *Pratomyces variabilis* (Boedyn and Verbunt) whilst some cases of *pedra* showed a fungus which they call *Piedra javanica* (Boedyn and Verbunt). Large drawings accompany these descriptions. Other cultures proved to be *Epidermophyton rubrum*, *E. interdigitale*, *Trichophyton plicatile*, *Favotrichophyton ochraceum* and *F. decipiens*. From the small amount of material available it would seem that epidermophyton infections head the list followed by *pedra*, pityriasis versicolor and microspora in that order. LEWIS MONTGOMERY and HOPPER¹¹ have studied *T. purpurum* (Bang) in great detail. The history geographical distribution microscopical and cultural characteristics are reviewed. They have studied 100 cases the average duration of infection being three years. As the disease is so resistant to treatment experimental inoculation of volunteers was not attempted. The feet were involved in 88 cases the hands in 39 trunk in 15 the inguinal region in 12 a curious gyrate eruption was found on the body in 4 and the face was attacked twice. In all, 68 patients showed nail infection. Some exacerbation occurred during the summer months but the clinical features always involved serious differential diagnosis from psoriasis arsenical dermatitis of the palms neurodermatitis eczema syzosis and erythema annulare centrifugum. Indeed diagnosis sometimes depended on the results of culture. On the palms and soles the skin was dull red slightly thickened and bore a branny trace of vesiculation. Fissuring of the patches occurred when they desquamated. The edge was always sharply defined but there was no involvement of the interdigital spaces and the joint areas of the hands. On the body the same dull red scaly appearance was presented but there was also some tendency to central resolution of the circinate

¹⁰ GONAR (N.) The First Survey of Ringworm in Egypt.—*Jl Trop Med. & Hyg* 1938 July 15 Vol. 41 No. 14 pp. 229-234 With 5 charts.

¹¹ BOEDYN (K. B.) & VERBURGH (J. A.) Annotations about Dermatomyces in Batavia.—*Mycopathologia. The Hague*, 1938 Sept. 18 Vol. 1 No. 3. pp. 185-198 With 4 figs. & 6 plates.

¹² LEWIS (George M.) MONTGOMERY (Royal M.) & HOPPER (Mary E.) Cutaneous Manifestations of *Trichophyton Purpureum* (Bang).—*Arch Derm. & Syph.* 1938. May Vol. 57 No. 5 pp. 823-839 With 8 figs. [23 refs.]

patches so that there was a superficial resemblance to *trinea circinata*. Sometimes the plaques were thicker and more heavily scaling, whilst in others the configuration was bizarre even suggesting *trinea imbricata*. The nails were opaque lustreless, friable yellowish, irregular and showed subungual hyperkeratosis. In spite of deep involvement of the nail the surrounding tissues were sometimes unaffected, the interdigital skin even being clean. A case of generalized infection with *T. rubrum* is described by GODAL¹³. The patient was a soldier who had just returned from Indo-China, having previously served in Madagascar and China. The disease was said to have been present for ten months. Practically the whole of the glabrous skin bore sharply defined large red plaques with slight flaking and vesiculation at the polycyclic edges. There was some lichenification, with folliculitis and scattered pustules. The nails and hair were unaffected. The same fungus has been studied by CATAXEI¹⁴ who obtained material from a native of Tonking the lesions being on the buttocks, flanks and umbilicus. The scales showed very numerous mycelial elements, sometimes moniliform. Cultures were at first smooth and white but the centre became heaped and downy after three weeks. At this time the colony had assumed a reddish purple colour except for the centre which remained whitish. Pathogenicity to guinea-pigs and monkeys was proved but the hair was not attacked in them. This organism corresponds with *T. rubrum* (Castellani 1909) and is placed in the second section of trichophyta in the classification of Langeron and Milobevitch. FRASER¹⁵ has investigated the viability of epidermophyta and trichophyta in an attempt to account for the disappointing results seen in the treatment of foot infections. The fungi remain viable in scales for over a year and *in vitro* they withstand cold better than heat. Attempts to infect dry scarified skin were always unsuccessful. The pH in the fourth interdigital space was found to be high and might possibly be caused by decomposition of sweat. The fungicidal properties of many chemicals and physical agents were reviewed. It is stressed that X-rays in safe doses, never kill fungi, which are also more resistant to ultra violet light than are bacteria. Perchloride of mercury and iodine seem to be the most efficient chemicals phenol dyes etc. being far behind them. Whilst it is true that viability in scales is persistent there is no direct proof that pathogenicity is retained. Most treatments also have a penetrative effect so that it is difficult to account for the therapeutic failures. It is concluded that greater attention must be paid to the soil, i.e. hygiene and ventilation of the feet are of supreme importance.

Least infections—*Dermatitis eutorulosa* is the name given by KESTEVEN¹⁶ to 13 cases which showed localised papulo-vesicular

¹³ GODAL (J). Un cas d'épidermophyte généralisée à *Trichophyton rubrum*.—*Bull. Soc. Path. Exot.* 1933. May 11. Vol. 31. No. 6. pp. 337-339.

¹⁴ CATAXEI (A). Sur la place de *Trichophyton rubrum* dans la classification. Etude parasitologique et expérimentale d'une nouvelle souche de ce champignon.—*Arch. Inst. Pasteur d'Algérie* 1933. June. Vol. 18. No. 2. pp. 227-231. With 3 figs. on 1 plate.

¹⁵ FRASER (P. K). The Viability of Some Common Pathogenic Fungi.—*Jl. Trop. Med. & Hyg.* 1933. Oct. 1. Vol. 41. No. 19. pp. 310-314. [72 refs.]

¹⁶ KESTEVEN (H. Leighton). *Dermatitis Eutorulosa*, with a Description of the Causative Fungus.—*Med. Jl. Australia*. 1933. June 4. 25th Year. Vol. 1. No. 23. pp. 963-967. With 3 figs.

and or exornated and weeping inflammatory condition of the skin due to invasion of the skin by *Euoriza excorians* Kesteven and causing more or less itching. The clinical diagnosis cannot be made with certainty but the presence of a sodden fringe to the patch with the presence of vesicles is suggestive. Between the toes the skin is markedly sodden and white but blisters are more common on the side of the foot. The organism has also been found in an acute red intertrigo of the groins in an indefinite vesicular eruption of the legs and arms and on the palms where the edges of the lesion are more definitely sodden and may even bear pustules as well as vesicles. It may cause a chronic paronychia which shows no crusting but a watery discharge. The author has succeeded in producing typical lesions on his own arm by inoculation of this yeast and has also recovered the organism from the resultant dermatitis. Treatment has proved efficient by the use of a 1 per cent solution of dihydroxyacetanilol in benzol by a 1 per cent solution of paradinitrophenol in water and by the free use of Tinct. Iodi. A full description of the organism is included the author concluding with a criticism of the vague and muddling nomenclatures and poor descriptions of fungi in general and of yeasts in particular.

Achromia — CASTELLANI¹⁷ describes this condition as seen in Central America and the West Indies. The moulds and fungi which have been described in these cases are regarded as non pathogenic by the author. (The variety of achromia seen in Cuba by PARDO-ASTELLO [see this *Bulletin* 1937 Vol. 34 p. 259] is different and is caused by fungi). The face and neck are most commonly attacked. The patches which may be as large as half a crown, are at first slightly wrinkled and scaly later becoming smooth. There is complete loss of pigment so that the areas appear to be yellow or pale yellow when they occur in negroes. There are no subjective symptoms whatever and the discs seldom coalesce. They are very persistent but sometimes do repigment. The differential diagnosis from a case of tinea flava in which the fungus has disappeared is practically impossible. All treatment including antmycotic remedies is useless. Some disguise can be obtained by the use of an appropriate dilution of potassium permanganate.

Mycosis fungoides — WILSON¹⁸ has treated four cases of this disease by means of injections of ethyl chaulmoograte as first suggested by LUNHOLDT in the *Acta Derm Ven* during September 1936. The treatment is long and tedious requiring exact determination of the dosage in each case. Three cc have even been injected twice a week for as long as 12 months. Although there is cessation of itching after the third or fourth injection there is no suggestion that cure has ever been attained.

Xeroderma pigmentosum — The disease has been seen in five children out of a family of six by BURNET¹⁹ et al. The parents are young natives

- ¹⁷ CASTELLANI (Aldo) *Achromia Flava Amycetica* (Pseudotinea Flava) Vol. 41 No. 19 pp 309-310 With 1 fig. *J Trop Med & Hyg* 1938 Oct. 1
- ¹⁸ WILSON (Sidney J.) *Ethyl Esters of Chaulmoogra* Vol. 31 No 6 pp 675-678. *Southern Med J* 1938 June.
- ¹⁹ BURNET (Et.) JADYARD (H) & LARABI (M) *Chromique tunisienne du Xeroderma pigmentosum XIX XX XXI XXII et XXIII observations (23e 24e 25e 26e et 27e cas)* — *Arch Inst Pasteur de Tunis* 1938 Sept. Vol. 27 No. 3 pp 304-307

of Tunis. Although there was no previous family history of the disease it is noteworthy that the parents are cousins. The two eldest children both girls died at the ages of 7 and 6 years. Since then the other children have been kept indoors—these are now aged 5 years, 3 years and 14 months. The first signs developed at the ages of 12, 9 and 6 months respectively. The sixth and youngest child died of diarrhoea at the age of three months, at which date no skin changes had appeared. All the cases are typical. In another Tunisian family of five children, two sisters now aged 20 and 16 suffer from xeroderma pigmentosum which first started at the age of four years in both. These have been described by CHATELLIER²⁰. Twenty five cases of this disease (including all the above) have now been detected in Tunis.

Mango dermatitis.—One of the most interesting papers has been contributed by KIRBY SMITH²¹. Cases of this affection have been noted since 1832 but so far they have not been mentioned in any text-book. The mango a member of the Anacardiaceae as is the poison ivy is very sensitive to cold so that its distribution in the United States is restricted to Florida. A world-wide questionnaire revealed the fact that the dermatitis has been seen and recognized occasionally in India, Mexico, Brazil, the Philippines and Colombia. The hands, neck and face particularly the lips, are the sites of election. Stomatitis may also be present and an acute gastro-enteritis often completes the picture. Six to twenty four hours after contact with the fruit usually of course direct eating, there appear vesiculation and oedema of the face and lips. Burning and itching are always present and in some cases the effects are so severe that prostration ensues, but no deaths have ever been noted. It is generally believed that the substance of the fruit is innocuous, but it is undoubtedly true that the peel, resin from the stem or sap itself can be causative. Tests show that the irritant is non-protein, non-volatile and is destroyed by exposure to 56°C. for five minutes. It is soluble in ether, chloroform, alcohol, etc. Oxidation has apparently destroyed it in the older exposed resin-like sap. Thirty-five volunteers underwent tests and five of them gave positive reactions. The author has succeeded in collecting 68 positive reports in all, most of them coming from Florida.

Sydney Thomson

GAVIDIA ALVARADO (E. R.) NEGRI (Tomas) & MOSTO (Domingo). *Esporotricosis de pierna*. [Sporotrichosis of the Leg].—*Presencia Med. Argentina* 1938. Sept. 7. Vol. 23. No. 36. pp. 1685-1695. With 5 figs. [46 refs.]

A general account of sporotrichosis with an illustrative case in a Spanish woman, 50 years of age. This calls for no further detail here. The author gives an elaborate classification, based on clinical findings and appearances, dividing cases into three main groups: 1. With more or less local extension. 2. More widespread with lymphangitis and perhaps lymphadenitis. 3. With ulceration and abscess formation. Each of these is further subdivided and in a table over 30 clinical forms are named. H H S

²⁰ CHATELLIER (Louis). XXIV^e et XXV^e observations du *Xeroderma pigmentosum* en Tunisie.—*Arch. Inst. Pasteur de Tunis*, 1936. Sept. Vol. 27. No. 3. pp. 308-310. With 8 figs. on 2 plates.

²¹ KIRBY-SMITH (J. Lee). Mango Dermatitis.—*Amer. J. Trop. Med.* 1936. July. Vol. 18. No. 4. pp. 373-384. [34 refs.]

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

PRECIS OF ABSTRACTS IN THIS SECTION

In the section which follows CHANG (p 107) reports on the clinical findings and treatment of cases of relapsing fever. In Changsha the disease is louse borne and is common among dealers in old clothes and rare in children. An explanation for this is offered. SERGENT (p 108) records failure of vaccination for nine months and may produce a state of racial premonition for two years. MOISE (p 109) considers that *O. savignyi* is the vector in Abyssinia and AVANESSOV (p 109) incriminates ticks of the genus *Ornithodoros* species as yet not identified in Afghanistan while WHEELER (p 109) shows that *O. hermsi* is a vector in California. An obscure case of spirochaetal infection in Kentucky is described by PALMER (p 109). FENG and CHUNG (p 110) record the results of the incubation of infected ticks at various temperatures. JOYEY and SALTER (p 110) were successful in producing infection in rats fed on the brains and viscera of previously infected animals thus demonstrating the possibility of alimentary infection while L ABBATE and MANNINO (p 111) consider that Mannino became infected through a spurt of blood from a patient with relapsing fever which entered his nostril accidentally. CHUNG and FENG (p 111) failed to infect splenectomized squirrels by means of infected bedbugs (*Cimex lectularius*). True positive reactions to Kolmer's Wassermann Kahn and Kline tests were not given by patients with relapsing fever unless there was concurrent syphilis in a series of 238 specimens investigated by TSUN and CHUNG (p 111). BRUSSIN and STERNBERG (p 112) show that if mice infected with *S. recurrentis* are given an injection of neosalvarsan there follows a very marked production of antibodies. They record experiments on these lines in splenectomized animals and in those in which the R.E. system is blocked. In their second paper (p 113) these authors show that the earlier salvarsan was given the slower was the development of antibodies and that the killed spirochaetes apparently acted as vaccines.

CHANG (Shih lu) Relapsing Fever in Changsha. A Report of 41 Cases.
—*Chinese Med J* 1938. Aug Vol. 54 No 2 pp 163-172
[15 refs.]

A study of 41 cases (4 fatal) of relapsing fever during the four years 1933-36 in the province of Changsha. 41 per cent of the cases occurred amongst dealers in old clothes etc. which is not surprising in view of the fact that the disease is louse-borne. No case was observed in children below nine years old and the comparative rarity of the disease in children seems to be owing to the fact that they seldom crush the lice on the skin which is necessary in order to produce infection. Fever anorexia headache body aches and constipation are the most common symptoms and the onset is nearly always acute. Jaundice and enlargement of the liver and spleen are often observed. A high leucocytosis and also intense jaundice and liver enlargement are considered signs of poor prognosis. In 28 cases 11 had a positive Wassermann and 4 a positive Kahn test. On re-examination, 5 out of 6 of the former had become negative. 1 of the latter remained positive.

Thirty two cases were treated with 0.15 to 0.3 gm. neosalvarsan but the smaller dose is considered sufficient. Five patients showed a bad reaction and 3 died. Nine cases were treated with 2 to 3 cc. of acetylarsan. Glucose given intravenously immediately before the arsenic treatment is said to have reduced untoward reactions.

Relapses occurred in three cases, of which one might have been due to reinfection. E Hindle

CLELAND (J. B.) A Death from Relapsing Fever in Australia.—*Med Jl Australia* 1938. May 7. 25th Year. Vol. 1. No. 19. pp. 820-821.

The record of the case of an Indian seaman who died in Adelaide in 1921. The enlarged spleen was kept in the museum and has now been re-examined and found to contain spirochaetes. E. H.

SERGEANT (André) Fièvre récurrente à *Spirochaeta hispanica* en Algérie. Transmission par le rhinophale du chien. Prémunition. Sérum de convalescents. Relapsing Fever caused by *Spirochaeta hispanica* in Algeria. Transmission by the Dog Tick, *Rhipicephalus*. Prémunition. Convalescent Serum.—*Ann. Inst. Pasteur* 1938. Sept. Vol. 61. No. 3. pp. 217-254. With 14 figs. [21 refs.]

A valuable résumé of observations on Algerian relapsing fever prepared in memory of the late André Sergeant.

Most of the results have been previously reviewed in this *Bulletin* but some further details are included.

Attempts at vaccination by means of dead spirochaetes, killed either by cold or exposure to bile gave negative results. Treatment of infected guinea-pigs by the serum of refractory animals produced disappearance of the spirochaetes when pig serum was injected, and when the organisms reappeared they were less numerous than in control guinea-pigs. Donkey serum had no effect. Novarsenobenzol was found to have no curative effect on this infection except in toxic doses.

The latter half of the paper is concerned with latent infection and "premunition". The duration of the latent infection was tested by killing guinea-pigs at various intervals after the first attack, and injecting emulsions of the brain into normal guinea-pigs. The results show that infection can persist up to nine months after the original attack and also confers a "racial premunition" which can last for at least two years in the guinea-pig. This is accompanied by a "specific premunition" which is less intense than the racial premunition but, when present causes the partial or complete suppression of any attacks resulting from reinoculation.

Finally details are given of the therapeutic use of convalescent serum in guinea-pigs and the author advocates its use for the treatment of human infections [see this *Bulletin* 1936 Vol. 33 p. 696]. E. H.

MOSE (R. M. Regolo) Ricerche epidemiologiche e sperimentali sulla trasmissione e patologia della febbre recorrente in Somalia (1932-1937) [Relapsing Fever in Somalia, 1932-37].—*Ann. di Med. Ver. e Colon* 1938. July-Aug. Vol. 44. No. 7-8. pp. 315-327. With 2 plates, 7 charts & 4 figs.

Ornithodoros moubata has been regarded as the transmitter of relapsing fever in Abyssinia and Somaliland, but the author after a

fairly extensive examination has concluded that *O. savignyi* is present in large numbers whereas *O. moubata* is relatively quite scarce and that as far as concerns relapsing fever it is the former *O. savignyi* which is of epidemiological importance
H H S

AVANTSOV (G A) [Case of Spirochaetosis transmitted by Ticks in Afghanistan.]—*Med Parasit & Parasitic Dis* Moscow 1938 Vol. 7 No 1 [In Russian pp 88-94 With 2 figs. French summary p 94]

In view of the absence of any previous records of relapsing fever transmitted by ticks in Afghanistan the author reports a number of cases in Europeans and Natives and describes the symptoms observed. These cases were associated with the finding of ticks of the genus *Ornithodoros* the species of which has not yet been identified. Treatment with neosalvarsan was found to be effective only during the first days of the attack but some cases proved to be refractory. In Afghanistan the incidence of tick fever is seasonal with two peaks—at the beginning of summer and at the end of autumn

C A Hoerr

WHEELER (Charles M) Progress of Spirochaete Infection in the Developmental Stages of the Host Tick, *Ornithodoros hermsi* Wheeler—*Amer J Trop Med* 1938 July Vol 18, No 4 pp 413-419 With 3 charts. [10 refs]

Details of experiments on the transmission of a Californian strain of spirochaetal relapsing fever by *Ornithodoros hermsi*

The larvae hatching from eggs laid by infected ticks five from Big Bear Lake and two from Lake Tahoe were tested for the inheritance of infection by feeding both these larvae and the successive nymphal stages on white mice. Out of 672 larvae tested only 2 produced infection but even this low percentage (0.29) is apparently sufficient to ensure its persistence

In a further series of experiments clean larval ticks were fed on infected mice and subsequently the later developmental stages of the ticks were fed on normal mice and from 35 to 48 per cent were found to transmit the infection. Moreover clean larvae from a female taken at Lake Tahoe were infected with a strain of relapsing fever originating from a tick at Big Bear Lake
E H

PALMER (Lee) Spirochaetal Blood Stream Infection of Undetermined Type Report of a Case.—*Southern Med J* 1938, May Vol 31 No. 5, pp 530-534 With 10 figs.

Details of a case of obscure spirochaetal infection in a 3-year-old boy in Louisville Kentucky. The spirochaetes were found in the patient's blood by dark ground examination and also in a rat that had been inoculated 10 days previously with some of his blood.

The spirochaetes are said to be sluggishly motile slender about 15 μ in length with three to five spirals, and were found on 12 to 14 occasions. The patient had 27 to 30 attacks of fever going up to 105-106°F each lasting 2 to 10 days with a 2 to 7-day interval between the bouts. The attacks were accompanied by the development of a rash resembling German measles, secondary lues or rose-spots but

except for this and malnutrition physical examinations were entirely negative.

The condition failed to respond to 18 intravenous 0.2 gm. doses of neocarsphenamine 12 doses of Mapharsen 0.015 gm. stavarsol, 15 injections of bismuth, and potassium iodide extending over a 10 months illness. Five months after the onset he developed pericarditis with effusion.

E H

FENG (LAN-CHOU) & CHUNG (HUEL-LAN) The Effect of Temperature on the Development of *Spirochaeta duttoni* in *Ornithodoros moubata* — *Chinese Med J* 1938 Mar Supp No 2 pp 555-562.

A continuation of the authors previous paper on this subject [see this *Bulletin* 1937 Vol. 34 p 353] concerning the development of *Spirochaeta duttoni* in *Ornithodoros moubata*.

When the ticks were kept at 5° to 8°C. immediately after the infective meal the spirochaetes remained alive in the stomach up to 63 days and only a very small number passed through the stomach wall and reached the other organs of the body. By the 81st day all spirochaetes had disappeared from the ticks, and incubation at 25° to 30°C. did not restore their infectivity or bring about a reappearance of spirochaetes.

When the ticks were first incubated at 25° to 30°C. for about two months to ensure a well established infection, and then kept at 5° to 8°C. the spirochaetes did not disappear for at least 60 days, and the ticks produced infection when fed on susceptible animals.

The dissections of ticks kept at 25° to 30°C. up to 197 days after infection showed that spirochaetes invariably disappeared from the stomach contents by the 12th day, but remained present in the salivary glands, the reservoirs of the coxal glands and the nerve ganglia which seem to be the best sites for their development. Spirochaetes were also found in the genital glands and occasionally in the Malpighian tubules.

E H

JOYEUX (Ch.) & SAUTET (J) Importance de la voie digestive pour la transmission du *Spirochaeta duttoni* [The Importance of the Alimentary Canal in the Transmission of *Spirochaeta duttoni*] — *Bull Soc Path Exot* 1938 Apr 6 Vol. 31 No 4 pp 279-281

Using a strain of *S. duttoni* from Brazzaville, the authors have fed normal rats with infected tissues with the object of testing the possibility of this method of transmission.

Infection was produced in rats by feeding them with the brains of rats infected respectively 15 and 21 days previously by inoculation, but when the brains (24) of rats that had been infected six months previously were used, no infection was produced by feeding. The ingestion of the viscera of infected rats also gave positive results.

The infections produced by feeding had a longer incubation period (10-14 days) than when infection was produced by *Ornithodoros* and also the febrile reaction was much less severe, without relapses.

E H

L ABRATE (G) & MANNINO (S) Sopra un caso di febbre ricorrente stabilitasi per contagio diretto [A Case of Relapsing Fever contracted by Direct Contagion.]—*Arch Ital Sci Med Colon e Parassit* 1938 Aug Vol. 19 No 8. pp 486-489

One of the authors (Mannino) was taking blood from the finger of a patient at Gondar Abyssinia and during the process a few drops (possibly from a small artery) spurted into his nostril. The blood contained numerous spirochaetes in every field.

On the eighth day Mannino became feverish and the following day suffered from vomiting diarrhoea occipital headache and generalized pains his temperature being 40°C. A blood examination on the third day of fever showed scattered spirochaetes small delicate and feebly stained very different from those seen in the original case and resembling the metacyclic forms described by LEISMAN in *O. moubata*.

Mannino is convinced that no opportunity for infection by vermin could have occurred and the district in which he lived is not an endemic area. His symptoms were the same as those of his patient and according to BRumpt are characteristic of the tick borne type. The authors therefore consider that the infection was acquired from the blood entering his nostril, and that it may have been facilitated by an unhealthy state of the mucous membrane due to rhinitis a little time previously. They discuss and do not reject the hypothesis that the spirochaetes thus directly transmitted might have undergone metacyclic development in his blood as they would have done in the body of a tick. C IV

CHUNG (Hui-Lan) & FENG (Lan-Chou) Studies on the Development of the Chinese Strain of *Spirochaeta recurrentis* in *Cimex lectularius*—*Chinese Med J* 1938 Mar Supp No 2. pp 563-577

Bedbugs (*Cimex lectularius*) were fed on splenectomized squirrels heavily infected with a Chinese strain of *Spirochaeta recurrentis* and subsequently examined for the persistence of spirochaetes.

The gastric juice of the bedbug seems to have an adverse effect on *S. recurrentis* for most of the spirochaetes were dead in 24 hours and only occasionally a few survived for two days.

Spirochaetes may be found in the legs and coelomic fluid within one and a half hours of an infective meal but they often succumb without further development and the longest period they were found to survive was twelve days. On one occasion a single spirochaete was found in the nerve ganglia but the Malpighian tubules and salivary glands were invariably negative.

Three splenectomized normal squirrels were each bitten by more than 60 bedbugs containing spirochaetes without being infected. Moreover the eggs and nymphs derived from infected bedbugs contained no spirochaetes and were not infectious. E H

Ts UN (Tung) & CHUNG (Hnei Lan) The Kolmer's Wassermann, Kahn and Kline Tests in Relapsing Fever—*Chinese Med J* 1938 Mar Supp No 2 pp 315-324 [14 refs]

A total of 238 specimens of sera from 88 cases of Chinese relapsing fever at the Peiping Union Medical College were subjected to various

tests 102 to Kolmer's Wassermann Kahn and Kline tests simultaneously 18 to the first two of these tests 114 to Kolmer's Wassermann and Kline tests and 4 to Kolmer's Wassermann test alone. The results show that the sera of seven patients gave positive reactions considered to be due to relapsing fever but only in a transient and irregular manner. Sera of 29 cases in which concurrent syphilitic infection was present were consistently positive.

Although 7.95 per cent. of the relapsing fever patients gave false positive reactions with these various tests the transient and irregular appearance of these reactions readily distinguished them from the positive reactions observed in syphilis. E H

BRUSSIN (A M) & STERNBERG (E J) Ueber die Bedeutung des retikuloendothelialen Apparates bei Infektionskrankheiten. XV Die immunisatorische Funktion des Retikuloendothelial systems beim Rückfallfieber [The Significance of the Reticuloendothelial System in Infectious Diseases. XV The Immunizing Function of the Reticulo-Endothelial System in Relapsing Fever]—*Giorn di Bacteriol e Immunol* 1938 July Vol. 21 No 1 pp 46-62. With 1 chart. [31 refs.] English summary (4 lines.)

An account of experiments supporting the view that the reticuloendothelial system is the source of antibodies against *Spirochaeta recurrentis* and *Trypanosoma equiperdum*. Quantitative estimations were made of the titre of the immune bodies in the blood of infected mice with the R.E.S. intact and in others with this system blocked.

Advantage was taken of the fact that when mice infected with *S. recurrentis* are injected with neosalvarsan, the destruction of the spirochaetes in the tissues is followed by a very marked production of antibodies. Accordingly, normal mice and others splenectomized one day previously, were each injected with a dose of 0.5 cc. of a 1:400 solution of neosalvarsan per gramme body weight, followed 30 to 60 minutes later by an intraperitoneal inoculation of 0.02 cc. blood containing 1-2 spirochaetes (*S. duttoni*) per field. The titre of antibodies against the spirochaetes in these mice was estimated by means of the adhesion test (depending on the thrombo-cytobarin content) and in the case of normal mice the titre rose to 3,800 by the sixth day and after reaching 4,000 on the eighth fell to about 1,000 on the tenth day and then to a level of about 200. In the case of the splenectomized mice however the titre only rose to a maximum of about 300 by the tenth day and then dropped to below 100. Similar results were obtained with splenectomized mice that in addition had had the R.E.S. blocked by injections of sugar of iron, but in this series the dose of neosalvarsan was increased to 0.5 cc. of a 1:100 solution per gramme body weight.

The immunizing function of the spleen, however, is gradually replaced by the compensatory action of the remaining reticuloendothelial tissue, the rate at which this occurs depending on the nature of the antigen.

By injection with neosalvarsan previous to the inoculation of the organisms it is possible to immunize an animal against the spirochaetes of relapsing fever without the development of a latent infection by diminishing this previous dose of neosalvarsan, however although infection is not prevented, the course of the disease can be varied since the duration of the latent period is lengthened.

In mice the antibody formation against spirochaetes is much stronger than against trypanosomes. The authors' experiments support the view that it is only by making comparative quantitative estimations of the antibody titre in animals that had received a previous injection of neosalvarsan that it is possible to follow the differences between normal splenectomized, and splenectomized and blockaded animals respectively. If the infectious had been allowed to develop normally, it would not have been possible to observe the differences in antibody formation. E. H.

BRUSIN (A. M.) & STERNBERG (E. J.) Ueber den Einfluss der Salvarsanpräparate auf die Antikörperbildung beim Rückfallfieber [The Effect of Salvarsan Preparations on Antibody Production in Relapsing Fever]—*Giorr. di Batterio' e Immunol.* 1938. Aug. Vol. 21. No. 2. pp. 207-225. With 2 charts. [19 refs.]

Working with relapsing fever infection in mice the authors studied the development of antibodies by the thromboeytobarru reaction. They found that the earlier salvarsan was given, the slower was the development of antibodies. The spirochaetes that were killed by the salvarsan apparently acted as vaccines, but their immunizing power did not seem to differ from that of spirochaetes succumbing to the natural defences of the body. No evidence was obtained to suggest that salvarsan stimulated the antibody-forming mechanism, and its chief value therefore lies in its power of destroying the spirochaetes directly. G. S. Wilson.

LEPTOSPIROSIS

PRECIS OF ABSTRACTS IN THIS SECTION

DAS GUPTA (p. 114) records five further cases in Calcutta occurring sporadically and not associated with any common conditions. Infection in rats is rare in Calcutta. The organisms isolated belonged serologically to the *L. icterohaemorrhagiae* group. VAUCEL (p. 114) summarizes observations in Indo-China, describing the well marked serological types found. GLOTZER (p. 115) records infection by *L. icterohaemorrhagiae* in a fish cutter in New York and raises the question of the inclusion of this disease among those counted as occupational hazards. He stresses the importance of bearing in mind Weil's disease in waterfront cities. KAUFMAN (p. 115) shows the general agreement in the serological reactions of strains of leptospira of Weil's disease and the distinctive differences between them and *L. canicola*. ESSEVELD and MOCHTAR (p. 115) describe *L. parva* isolated from field rats in Java. It differs from all the strains with which it was compared and is not definitely pathogenic for guinea-pigs. A single rat strain in Java was found to be identical with the "Salinam" strain which causes leptospirosis in Sumatra. JOHNSON (p. 116) describes eight cases of mild disease in Queensland caused by the Pomona type of leptospira, which is serologically distinct from *L. icterohaemorrhagiae*. The epidemic occurred probably as a result

of heavy rain, as a consequence of which rural workers are brought into contact with mud and water which if infected, may retain the living organism for a considerable period. WALCH SORGDRAGER, BOHLANDER and SCHÜFFNER (p. 116) describe the peculiarities of the disease in three districts of Queensland. In Ingham two strains were found, Ballico (a new strain) and "Zanoni," and in Pomona a hitherto undescribed strain. The authors propose the name *L. australis B* for the Zanoni strain until it is decided whether or not it belongs to the Salunem group. SEFTON (p. 117) describes the appearance of acute yellow atrophy in the liver of a patient in Brazil. *L. icterohaemorrhagiae* was obtained in preparations of the liver and it may be that from a similar case NOGUCHI isolated his "*L. icteroides*." VAN DER WALLE (p. 117) found positive reactions to *L. icterohaemorrhagiae* in 15 and to *L. canicola* in 29 of 100 dogs in Antwerp.

C II

DAS GUPTA (B M.) *Leptospirosis in India.*—*Indian Med Gaz* 1938, Aug. Vol. 73 No. 8, pp. 449-453. [11 refs.]

A description of five more cases (three fatal) of leptospirosis in Calcutta, from one of which the causal organism was isolated the remaining four being diagnosed by agglutination and other tests.

Including one previously described (see this *Bulletin* 1938 Vol. 35 p. 129) six cases have been seen within the past eight months. The infecting organism belongs to the same serological group as the typical *L. icterohaemorrhagiae* but the two strains isolated could be differentiated by protection tests.

The most curious feature of these cases is their epidemiology for they occurred sporadically in different quarters of the city and were not associated with river bathing, polluted water or any particular occupation. Moreover the incidence of this infection in the rat population of Calcutta is extremely low. KNOWLES in 1928 found none infected out of 180 rats examined and Knowles and Das Gupta (1932) 2 out of 183. Recently 162 rats (mainly *Neotoma bengalensis*) were examined, and in addition twenty rat sera were tested for agglutination reaction with human strains, with completely negative results.

E Hindle

VAUCHEL (M.) *Contribution à l'étude des leptospiroses. Résultats acquis en Indochine* [A Contribution to the Study of Leptospiroses. Results acquired in Indo-China].—*Arch. Insts Pasteur d'Indochine* 1937 Oct. Vol. 7 No. 28, pp. 157-178. With 7 charts. [73 refs.]

A useful summary of observations on leptospiral infections in Indo-China, from which the author concludes that it is not practicable to divide them into different species on the results of agglutination reactions.

On the other hand there are well marked serological types which all seem to belong to the *L. icterohaemorrhagiae* group. These types seem comparatively rare in Europe (*L. icterohaemorrhagiae*, *L. grippotyphosa* and *L. canicola*) and similarly only three have been noted in Japan (*L. icterohaemorrhagiae*, *L. excrucians* and *L. abdominalis*). The three Japanese types are all found in the Netherlands Indies, the Malay archipelago and Indo-China but in these countries other

types are found which may possibly be intermediate forms. Of especial interest are the two strains Hebler and Tuyen-Quang isolated in Tonking which are very well marked and distinct types [see this *Bulletin* 1937 Vol. 34 p 706]

An extensive bibliography of the subject is given including a section devoted to leptospiroses in Indo-China. E H

GLOTZER (Solomon) Well's Disease Report of a Case in a Fish Worker—*Jl Amer Med Assoc* 1938 June 25 Vol. 110 No 26 pp 2143-2145

The record of a typical case of infection with *S* (*Leptospira*) *icterohaemorrhagiae* in a fish cutter in New York City. This is the twenty first reported case in the U S A and the second among fish workers. The author raises the question of its inclusion in the list of diseases accepted as occupational hazards for the disease is obviously liable to occur in types of work in which the individual is exposed to contact with rat excreta.

Weil's disease must also be considered in the differential diagnosis of jaundice especially in a waterfront city such as New York where rat infestation is present. E H

KAUFMANN (Otto) Vergleichende serologische Untersuchungen mit verschiedenen Stämmen der *Spirochaeta icterogenes* und mit der *Spirochaeta canicola* [A Comparative Serological Investigation of Various Strains of *Spirochaeta icterogenes* (*L. icterohaemorrhagiae*) and *S* (*L.*) *canicola*].—*Ztschr f Immunitätsf u Experim Therap* 1938. July 8 Vol. 93 No 3/4 pp 354-367 With 1 chart [28 refs.]

The author examined the serological reactions of 45 positive Weil sera preserved at the Hamburg Hygienic State Institute to three Weil strains—U Lisbon, and R104—and a strain of *L. canicola*. Complement fixation agglutination and flocculation tests were performed with each serum and the results confirm the view that although Weil strains show considerable variation there is a general agreement in their serological reactions. *L. canicola* on the other hand possesses well-marked distinctive characters separating it from *L. icterohaemorrhagiae*. E H

ESSEVELD (H.) & MOCHTAR (A.) Over het voorkomen van een nieuw leptospira type (*L. javanica*) en het Salnem-type bij veldratten op Java. [A New Leptospira type (*L. javanica*) and the "Salnem-Type" in Field Rats of Java].—*Geneesk Tijdschr v Nederl Indië* 1938. June 21 Vol. 78 No 25 pp 1513-1522. [29 refs.] German summary [Summary appears also in *Bulletin of Hygiene*]

SARDJITO Mochtar and WIRASMO were able to cultivate leptospirae from 21 per cent of field rats caught in mid Java. Twelve of those leptospira strains are now made the subject of comparative serological test by the agglutination lysis technique. High titre sera of nine known strains were used Wijnberg (*L. icterohaemorrhagiae* from Holland) Swart Tachmat Salnem Roesel (*L. canicola*) Moscow (*L. grippotyphosa*) Hebdomadis (Japan 7-day fever) Pomona (Australian) and Ballico (Australian). Eleven out of the twelve belonged to one type and differed from all of the test strains. They

were not definitely pathogenic for guinea-pigs and the strain was named *L. jaranica*. It has not yet been possible to compare this strain with *L. akirami* which however is markedly virulent for guinea-pigs and has as its reservoir an *Apodemus*-species not a rat species. Apparently the field rats in the vicinity of Batavia have also been found to be infected with *L. jaranica* and even cats have shown spontaneously acquired infection. It remains to determine whether this new organism is pathogenic for man in view of the importance of wet rice culture for Java.

The remaining 12th strain, R.A.148, was identified with the Salmem patient strain the cause of leptospirosis in Sumatra. It is obviously desirable that investigation as to the existence of this leptospirosis in Java should be made and also whether the field rats of Sumatra are infected.

W. F. Harvey

JOHNSON (D. W.) Mild Leptospirosis in Southern Queensland—a Classification of the Infecting Leptospira, and a Report of Eight Further Cases of the Disease.—*Med. Jt. Australia* 1938. May 7. 25th Year. Vol. 1. No. 19. pp. 805-813. With 6 figs.

A clinical description of eight cases of mild leptospirosis in Southern Queensland, caused by the Pomona type of leptospira which is serologically distinct from *L. icterohaemorrhagiae* and seems to be a new type. The outstanding clinical features were fever prostration, severe headache and generalized muscular pains. Delirium and conjunctival congestion were also noted in several cases. The duration of the fever was 3 to 8 days. Jaundice was not observed and there were no deaths. Two patients suffered from pain and swelling in the joints—one had a typhus-like rash and another became temporarily blind some two weeks after apparent recovery.

The epidemic at Beaudesert is considered to have arisen as a result of heavy rain as all 7 cases developed 7 to 15 days from the last day on which this occurred. The other case, at Pomona similarly, occurred 10 days after very heavy rain. For a few days after a heavy fall the rural population would be working in close association with mud and water. The water from a creek in this neighbourhood, with a pH of 7.1 was mixed with pathogenic leptospires of the Pomona type and the organisms persisted in the water for 33 days at room temperature (6°-24°C).

E. H.

WALCH SORGDRAGER (B.) BOHLANDER (L.) & SCHUFFNER (W. A. P.) Over leptospirosis in Australië en eenige opmerkingen over de oorsprong van de daar geïsoleerde stammen. [Leptospirosis in Australia. Remarks on the strains isolated there].—*Geneesk. Tijdschr. v. Nederl. Indië* 1938. Sept. 20. Vol. 78. No. 38. pp. 2299-2308. English summary. (Summary appears also in *Bulletin of Hygiene*.)

Cases of leptospirosis were reported from three districts Ingham, Pomona and Brisbane all in Queensland. The disease presents certain peculiarities in these districts. In Ingham it is found mostly among cane-cutters—the severity varies in some cases quite mild, in others severe and even fatal—jaundice does not occur in all. Two strains of leptospira were found. Ballico—a new strain, and "Zanoul," possibly distinct from, though showing certain co-reactions with, the Salmem group. Both were found in local rats. In Pomona,

a hitherto undescribed strain was isolated it sets up a mild fever lasting for a week and cases are seen every year. In Brisbane of three cases recorded one—ending fatally—was contracted in N. Queensland the other two were sewer workers in the town and clinically were typical instances of *icterohaemorrhagiae* infections.

The authors discuss some of the difficulties in classifying the Zanoni strain and until a decision is reached as to whether it belongs to the Salmem group or not they propose the name *L. australis* B. H. H. S.

SEFTON (Basil) *Espirochetose ictero-hemorrhagica* Subsidio aos estudos feitos no Brasil [A Case of Weil's Disease]—*Brasil Medico* 1938 Apr 16 Vol 52 No 16 pp 379-384 With 1 fig [66 refs.] [Summary appears also in *Bulletin of Hygiene*]

A man of 19 years of age when first seen by the author was suffering from headache loss of appetite dyspepsia slow pulse and was slightly jaundiced. Nine days later when again seen he was deeply jaundiced vomiting very weak and prostrated and clutching at his head. Death took place a few hours afterwards. At autopsy the liver showed the lesions of acute yellow atrophy. *L. icterohaemorrhagiae* was obtained in preparations and smears from the liver. [The interest of this case lies in the fact that it was probably in such a case as this that Noguchi first isolated his *L. icteroides* and was thus led to regard the organism as the cause of yellow fever] H. H. S.

VAN DER WALLE (N.) *Recherches sur l'existence d'infections à leptospires chez les chiens à Anvers*. [Investigations into the Presence of Leptospiral Infections in the Dogs of Antwerp]—*C. R. Soc Biol* 1938 Vol 128 No 21 pp 804-806

The results of the author's examination of the blood of 100 dogs in Antwerp are shown in the following table —

No of sera examined	Negative	Positive	Species of <i>Leptospira</i>	
			<i>L. ictero-haemorrhagiae</i>	<i>L. canicola</i>
Male 62	31	31	7	24
Female 38	25	13	8	5
Total 100	56	44	15	29

Cultures were made from the kidneys of these animals. 13 were contaminated 88 remained sterile and only one tube showed a culture of leptospira after an incubation period of about three weeks. This organism had a low virulence for guinea-pigs and in its serological reactions agreed with *L. canicola*. The serum of the dog from which this strain was isolated showed no signs of illness but its serum produced lysis of *L. canicola* in dilutions of 1:300 and *L. ictero-haemorrhagiae* in dilutions of 1:10. E. H.

BLACKWATER FEVER.

PRECIS OF ABSTRACTS IN THIS SECTION

FAIRLEY (p. 118) gives a résumé of the present state of knowledge of the visceral, plasma, biliary and faecal and urinary pigments in blackwater fever with special mention of pseudomethaemoglobin. FAIRLEY and BROMFIELD (p. 120) show that this pigment was found in the fluid from a pancreatic cyst and demonstrated on a Hartbridge reversion spectroscope. It can therefore be found outside the vascular system when blood escapes into a cavity is haemolysed and subsequently mixed with plasma or serous exudate. They describe methods of producing it artificially.

FOY and KORDI (p. 121) in Greece confirm the occurrence of pseudomethaemoglobin in the plasma and serum of blackwater fever patients, as described by FAIRLEY. Methaemoglobin is found in the urine but never in the serum in Greece. They discuss anuria and show that plasma albumin, globulin and fibrin fall within normal limits. The same authors (p. 122) found methaemoglobin, but not pseudomethaemoglobin, in the blood of a patient with cyanosis resulting from plasmoquine. The methaemoglobin was intracorpuscular and never appeared in the serum which contrasts with the pseudomethaemoglobin of blackwater fever which is always free in the serum.

JORDAN (p. 123) concluded, from an investigation of a patient with nocturnal haemoglobinuria, that the haemolysis was due to an abnormal state of the red cells. The remission of these appeared to be periodic.

HUBER, FLORAND LÉVRE and VÉRET (p. 123) describe a boy of 4 years with the extremely rare condition of the passage of myohaematin in the urine associated with slight fever jaundice and pains in the legs. There was no appreciable destruction of red cells.

PARISI (p. 124) saw 5 patients with blackwater fever in a total of 1,800 European soldiers treated for malaria in one year in East Africa. All had *falciparum* infections and recovered under treatment by atabrin (presumably the monomate). TRAPANI ANGLIERI (p. 124) treated a patient with *Synthesan* intravenously after the method of Ascoli. The patient recovered.

C II

FAIRLEY (N. Hamilton). Blood Pigment Metabolism in Blackwater Fever.—Reprinted from *Festschrift Bernhard Voeltz* ... 80 Geburtstag von seinen Freunden u. Schülern Hamburg 1937 pp. 123-130 [20 refs.]

In this short review the author deals with the phenomena resulting from intravascular haemolysis in blackwater fever but, as he points out, the mechanism by which the haemolysis is produced still remains to be solved.

After summarizing briefly the chief phenomena—clinical and pathological—associated with intravascular haemolysis, Fairley considers in turn the various pigments—visceral, plasma, biliary and faecal, and urinary—found in blackwater fever. There is nothing new in the article but it gives an excellent résumé of the present state of knowledge.

Visceral pigments—These consist of malarial pigment or haemozoin and haemoxydren. The former, which is similar to if not identical

with haematin is found in the cells of the reticulo-endothelial system and occurs as brownish black granules or clumps of black pigment and does not give the Prussian blue reaction. In blackwater fever it is found in small amounts but apart from malaria it is seen in the liver in only one other disease—schistosomiasis—in which disease it is formed from partly digested blood regurgitated into the portal vein by the worms. Haemosiderin occurs normally as a fine brown pigment in the parenchyma cells of the liver, spleen and kidneys—it is greatly increased in amount in blackwater fever and other diseases in which blood destruction is considerable. It contains 17 per cent of iron and gives the Prussian blue reaction.

Plasma pigments.—These are oxyhaemoglobin, pseudomethaemoglobin and bilirubin. The existence of oxyhaemoglobinaemia in blackwater fever has been recognized by the reviewer and his colleagues and by numerous other observers for many years. In view of the massive blood destruction in blackwater, the amount of haemoglobin free in the plasma is very small as compared with diseases like *Babes* infection. The explanation of this phenomenon is still obscure.

Methaemoglobin was first recorded in the blood of blackwater fever cases by BARRATT & YORKE (1909) and has since been observed by a number of workers. FAIRLEY and BROMFIELD (1934) [this *Bulletin* 1935 Vol. 32 p. 210] reported a new pigment closely allied to methaemoglobin in the plasma of a patient with blackwater and in 1937 found that it was present in all the more severe cases investigated in Macedonia [this *Bulletin* 1937 Vol. 34 p. 841]. They showed that this pigment had been erroneously regarded as methaemoglobin by all previous workers and named it pseudomethaemoglobin. The new pigment originates from extracorporeal haemoglobin; its maximum concentration is attained later than that of oxyhaemoglobin and in fatal cases its concentration often rises progressively until death. Pseudomethaemoglobin cannot function as a respiratory pigment; it is never found within the red corpuscles nor in the urine.

It was found experimentally that human plasma (normal as well as blackwater) converts extracorporeal haemoglobin into pseudomethaemoglobin and it was also found that when methaemoglobin, sulphaemoglobin, haematin, or an alkaline solution of a pure haemin was incubated with plasma at 40°C. pseudomethaemoglobin was formed. As a result of these observations Fairley and Bromfield concluded—

That there are two stages in the formation of pseudo-methaemoglobin in man: firstly the production of globin and haematin or haem from extracorporeal blood pigment, and, secondly the combination of haematin or haem with some nitrogen-containing substance in the plasma to form a compound—pseudo-methaemoglobin—which on reduction with sodium hydrosulphite gives a haemochromogen having a different spectrum to globin haemochromogen. The nature of the nitrogen-containing constituent is still being investigated.

Hyperbilirubinaemia occurs in all severe cases of blackwater and may persist after haemoglobinaemia has disappeared.

Biliary and faecal pigments.—Clinically, there is abundant evidence that an increased quantity of bile reaches the duodenum in blackwater fever since the stools are of bilious type and bilious vomiting is characteristic. This pleocholia is of course a direct consequence of the increase of haemobilirubin resulting from intravascular haemolysis. Fairley and Bromfield (1934) examined the bilirubin content of

blackwater fever bile and recorded values up to 4,900 units (2.45 per cent). These results tally with the experimental observations of Barratt and Yorke (1914) [this *Bulletin* 1915 Vol. 5 p. 254] who found that for 3 to 4 hours following the intravenous injection of rabbits with their own haemoglobin, the amount of pigment in the bile was increased by four to six times.

Urinary pigments.—Those of special interest are oxyhaemoglobin, methaemoglobin urobilin and a brown pigment found as a deposit in blackwater urine and generally regarded as acid haematin. The last is responsible for blockage of the renal tubules—it requires further investigation for it has not the solubilities of artificially produced acid haematin and owing to its insolubility is very difficult to investigate spectroscopically. The quantity of oxyhaemoglobin in the urine varies considerably in different cases, but according to Yorke and his colleagues even in the most severe cases of blackwater fever never more than 10 per cent. of the extra-corpuseular haemoglobin is excreted in this way. Physiologists think that extracorpuseular haemoglobin is filtered through the glomerulus of the kidney but Yorke and NAUSS (1911) consider that haemoglobin is secreted by the epithelial cells of the convoluted tubules, which are damaged in the process and undergo degenerative changes.

Methaemoglobin is responsible for the black discolouration of blackwater fever urine and its incidence varies with the reaction of the urine and the interval between the excretion of the urine and its examination.

IV Yorke

FAIRLEY (N. Hamilton) & BROMFIELD (R. J.) I. Pseudo-Methaemoglobin—its Demonstration in Pancreatic Cyst Fluid. II. Artificial Production of Pseudo-Methaemoglobin. [Demonstration.]—*Trans. Roy Soc Trop Med & Hyg* 1938. Jan. 25. Vol. 31. No. 4 pp. 374-376

Pseudomethaemoglobin, occurring naturally in pancreatic cyst fluid, as well as that produced artificially was demonstrated on a Hartridge reversion spectroscope.

The pancreatic cyst yielded over 3 litres of dark brown turbid fluid, which was just alkaline to litmus and contained albumin and diastase but no bile salts or pigments. The benzidine test was positive and an occasional red cell and leucocyte were found in the deposit. The authors have previously shown that pseudomethaemoglobin is produced in severe intravascular haemolysis—the present finding shows that it may also be produced outside the vascular system when blood escapes into a cavity—is haemolysed and subsequently mixed with plasma or serous exudate.

Pseudomethaemoglobin was produced artificially—

(a) By incubating solutions of oxyhaemoglobin with plasma derived from certain animal species. When one volume of a strong solution of oxyhaemoglobin obtained from man or the following monkeys—*Macacus rhesus* *M. usus* or *Cercopithecus aethiops*—was incubated at 40°C with three volumes of human or monkey plasma, pseudomethaemoglobin was produced within two or three days. When, however, solutions of haemoglobin were incubated with plasma from the rabbit, guinea-pig or rat pseudomethaemoglobin was not produced, although methaemoglobin sometimes appeared. Control solutions of

oxyhaemoglobin from all species readily produced methaemoglobin when incubated alone for 12 to 24 hours.

(b) By adding alkaline haematin to plasma derived from certain animal species. Alkaline haematin was prepared by adding pure haem to water made alkaline with two or three drops of a 10 per cent solution of sodium hydroxide. This was then added to plasma from man *Macacus* spp *Cercopithecus* sp and from certain other animals e.g. rabbit and guinea-pig. With human and monkey plasma pseudo-methaemoglobin was immediately produced but this was not the case with the plasma from other animals.

There can be little doubt that pseudomethaemoglobin is a by-product of haemoglobin katabolism and is formed both *in vivo* and *in vitro* by the union of haematin with some protein or other nitrogenous constituent of human and simian plasma. H J

FOX (HENRY) & KONDI (ATHENA) Spectrographic Analysis of Pigments in Serum and Urine of Blackwater Fever—*Trans Roy Soc Trop Med & Hyg* 1938 June 25 Vol. 32, No 1 pp 49-65 With 6 figs. [26 refs.]

In view of the discovery by FAIRLEY and BROMFIELD of a new pigment (pseudomethaemoglobin) in the plasma and serum of blackwater fever patients the authors have made a spectrographic analysis of all cases of this disease entering the Refugee Hospital during 1936 and 1937 they have also re-examined spectrograms taken in 1934 and 1938 and are able to confirm the existence of a pigment having its absorption maximum in the red at 622 and 624 $m\mu$. The present paper is concerned entirely with the qualitative aspect of the work in the visible region of the spectrum. The extinct coefficient of pseudomethaemoglobin cannot be obtained at present, since no known concentration of this pigment has yet been made and consequently no accurate qualitative work is possible. Some idea of a relative concentration of the pigment in different bloods is, however, obtainable by spectroscopic dilution and this method has been used in the present work.

The authors give the following extended summary of their results and conclusions —

1 Pseudo-methaemoglobin has been confirmed as a new pigment present in the vast majority of cases of blackwater fever in Greece.

" 2 This pigment has its absorption maximum of the band in the red at a point that varies between 622 and 624 $m\mu$, thus occupying a position intermediate between sulphaemoglobin (618 $m\mu$) and methaemoglobin (630 $m\mu$).

" 3 To represent the series of changes that are taking place in cases of blackwater fever spectrograms are given showing the absorption band of blood containing (a) pseudo-methaemoglobin, oxyhaemoglobin and bilirubin (b) pseudo-methaemoglobin and bilirubin.

4 To show the shift in the band of the three pigments spectrograms are given comparing the absorption maximum of the band in the red of pseudo-methaemoglobin, methaemoglobin and sulphaemoglobin.

" 5 A spectrogram of urine in a case of blackwater fever containing methaemoglobin is given to emphasize that methaemoglobin with its absorption band at 630 $m\mu$ is the pigment present in urine.

6 The presence of methaemoglobin in urine is not directly related to the presence of pseudo-methaemoglobin in blood.

7 Methaemoglobin in the urine is present in the bladder as shown by catheterization, carried out four hourly thus indicating that the formation of methaemoglobin in urine takes place higher up in the renal system than

the urinary bladder. Methaemoglobin when present in the urine is converted into sulphhaemoglobin on the addition of 10 per cent. yellow ammonium sulphide.

" 8 Methaemoglobin has been found to occur in urine when pH varies between 5 and 9 as taken potentiometrically.

9 Urines which contain no methaemoglobin when passed do not develop it on standing at laboratory temperatures for long periods (up to two weeks).

10 Considerable difficulty was found in correlating the degree of anuria with the amount of blood destruction and the pH of the urine and it is suggested that colligative changes in the blood, incident upon the liberation of large amounts of haemoglobin, may not be an unimportant factor in the genesis of anuria, in addition to the blockage of the renal tubules with haemoglobin. Estimations of the depression in the freezing point of serum (Δ) from anuric cases of blackwater fever would tend to support this view.

11 Estimation of plasma albumin, globulin and fibrin in blackwater fever indicate that these fall within normal range although the averages differ from normal averages, being somewhat lower in the case of total proteins and albumin, and raised in the globulin and fibrin. The $\frac{A}{G}$ ratio was sometimes markedly below normal.

12 Methaemoglobin has never been found in blackwater serum in Greece.

13 The magnitude and suddenness of the haemolysis is not the only factor determining the concentration of pseudo-methaemoglobin in blood, as shown by cases where great haemolysis has taken place yet the concentration of pseudo-methaemoglobin is often less than in cases when the haemolysis has been considerably lighter.

IV 3

FOX (Henry) & KOXDI (Athena). A Note on Intracorpustular Methaemoglobin in Plasmoehlin Toxicity—*Ann Trop Med & Parasit* 1938 Oct. 12 Vol 32 No 3. pp. 249-256 With 2 plates.

In view of the constant occurrence of pseudomethaemoglobin in blackwater fever in Macedonia, the authors have inquired whether the pigment found in cases of plasmoquine intoxication, and in the black water said to follow the administration of plasmoquine was methaemoglobin or pseudomethaemoglobin.

The cyanosis characteristic of plasmoquine poisoning has always been attributed to the presence of intracorpustular methaemoglobin, giving rise to a prominent absorption band in the region of the spectrum above 600 m μ . As however a similar band in blackwater fever had been erroneously described as methaemoglobin, it seemed desirable to ascertain the exact nature of the substance which produces the absorption band in the red in cases of plasmoquine poisoning.

The authors state that they have rarely seen an unquestioned case of cyanosis accompanied by the presence of abnormal pigments in the blood-stream in cases treated with normal doses of atabrin and plasmoquine [atabrin 0.3 gm. plus plasmoquine 0.03 gm. daily for five days]. Recently however such a case was encountered—the patient developed marked cyanosis, and abnormal pigments were found in the blood stream. Full details of the case are given and also the following summary of the observations—

1 Methaemoglobin, and not pseudo-methaemoglobin, has been found spectroscopically to be the pigment present in the circulating blood in cases of plasmoehlin toxicity.

2. This methaemoglobin is intracorpuseular and never appears at any time in the serum. This is in sharp contrast to the pseudo-methaemoglobin that occurs in blackwater fever which is always free in the serum.

3. Whether in cases of blackwater fever said to be provoked by plasmochin the methaemoglobin is present free in the serum as a consequence of the haemolysis, is at the moment impossible to say. It is not impossible that once the methaemoglobin has been liberated from the red cell it may be converted into pseudo-methaemoglobin.

4. The supernatant fluid from the lysed cells of the case of plasmochin toxicity incubated with serum at 37°C. formed pseudo-methaemoglobin, but this is not unusual since weak solution of haemoglobin incubated with serum will also form pseudo-methaemoglobin.

III Y

JORDAN (F. L. J.) Etudes sur l'hémogloburine [Studies in Haemoglobinuria.]—*Acta Med Scandinavica* 1938 Vol 95 No 2-4 pp 319-340 With 1 chart [59 refs.]

The author has studied two typical cases of haemoglobinuria *ex frigore* and a case with an atypical haemoglobinuria resembling in many respects the nocturnal haemoglobinuria of ENVERING. The last case was that of a girl of 25 years of age who had suffered from many attacks since December 1928. The urines passed after midnight and during the early morning were chiefly affected. The attacks were never precipitated by cold as in the case of haemoglobinuria *ex frigore*. There was no evidence of syphilis and the Wassermann and other reactions were negative.

In the case of nocturnal haemoglobinuria examination of the serum of the patient showed nothing abnormal and the haemolysis appeared to be due to an abnormal state of the red cells themselves. In both classes of case the haemolysis is activated by carbonic acid. In the case of nocturnal haemoglobinuria the sensibilization of the erythrocytes appeared to be the subject of periodic oscillations. Cholesterol had no effect on the haemolysis.

IV Y

HUBER (Julien) FLORAND (J.) LIÈVRE (J. A.) & NÉRET Crises myopathiques paroxystiques avec hémogloburine [Paroxysmal Myopathic Crises with Haemoglobinuria.]—*Bull et Mém Soc Méd Hôp de Paris* 1938 May 9 54th Year 3rd Ser No 15 pp 725-728

A detailed clinical account is given of the case of a boy four years old who was brought to the author's clinic with a painful spasm of the muscles of the legs associated with fever. The child was perfectly well until 30th January 1938 when after a short walk he appeared to be fatigued and to have lost his appetite. The following morning he complained of pains in the right foot. On 1st February the pains had extended all over the right leg and the child walked with difficulty. On 2nd February both legs were involved and the child was unable to walk, and on 3rd February he passed urine containing haemoglobin. When first seen by the authors on 4th February the temperature was 38.3°C the pulse 160 and there was slight jaundice. The lower portion of the body and especially the legs were very hyperaesthetic, and the child could not raise the heels from the bed. The muscles of the legs and the lumbar region were rigid, in a state of contraction, and very painful. The condition gradually disappeared and by the end of February he was apparently well.

This condition which is extremely rare in man is fairly common in horses. The pigment appearing in the urine is of muscular origin and is known as myohaematin. In the present case there was no appreciable destruction of red cells, the red cell resistance was normal the Donath and Landsteiner reaction was negative as was also Ehrlich's test. In all, only 4 or 5 human cases have been recorded. IV 1

PARISI (Ennio) Sull'emoglobinuria nei malarici e il suo trattamento terapeutico con atebirin [Blackwater Fever treated by Atebrin].—*Giorn. Ital. di Clin. Trop.* 1937 Sept. 30 Vol. 1 N. S. No. 9 pp. 270-71 273-6 278-80

Five cases are reported occurring in Italian Somaliland among European soldiers. In every one *P. falciparum* was seen in the blood all had taken quinine but not always very regularly. One stated that he had taken 0.4 gm. (6 grains) daily of the hydrochloride since his coming to the country. These five were the only cases seen among 1,800 malarial patients during the twelve months December 1935-November 1936 and the author suggests that an individual predisposition should be postulated, or "some other element which up to the present has escaped our observation [neither suggestion is very helpful]. All these patients were given atebirin with good result [The dosage employed is not stated but in the course of his preliminary remarks the author mentions that the musonate injected intra-muscularly thrice daily in doses of 12.5 cgm. in 3 cc. water has been recommended in the absence of any other statement it is to be presumed that this was the plan he adopted.] H H S

TRAPANI-ANGILERI (Rocco) Un caso di febbre litorale-emoglobinurica da malaria trattato con la cura di Maurizio Ascoli. [Case of Malarial Haemoglobinuria treated by Ascoli's Method].—*Riv. Sanitaria Siciliana* 1937 Oct. 15 Vol. 25 No. 20 pp. 1178-80 1183 [41 refs.]

A peasant aged 18 who had always lived in a malarious locality and who had suffered from attacks of malaria in the past had irregular fever for a week during which he was treated with small doses of quinine. He suddenly became acutely ill with a temperature of 104.9°F vomiting and diarrhoea. He became intensely jaundiced and passed blood-stained urine. He was given 1 gm. of quinine a day for four days and at the same time Ascoli's method of treatment was begun. After the first intravenous injection of *Serravallo's* the haemoglobinuria ceased after the third injection the temperature fell to normal. Recovery was uninterrupted. All the injections were well tolerated though there was a transitory pallor of the skin after the injection of each of the two final largest doses of the series. The conditions in which the patient was treated did not permit of a very thorough study of the case. N IV

MALARIA.

PRÉCIS OF ABSTRACTS IN THIS SECTION

WILSON (p 126) reports his findings in the non-immune and partially immune communities of Tanganyika Territory. Control becomes necessary where large numbers of non-immunes are present in endemic areas in townships estates and most undertakings of a temporary character. Treatment should not be indiscriminate and should not interfere with the development of immunity in endemic areas. The significance of parasites in the blood is discussed.

The MALARIA ADVISORY BOARD of the FEDERATED MALAY STATES (p 128) gives the reasons for the apparent increase in malaria in recent years. The results of tests of a number of drugs are given. Totaquina Type II is effective and cheaper than quinine hydrochloride. An anopheline survey is reported.

SCHÜFFNER (p 129) discusses the value of the spleen rate and the necessity for blood examinations in a correct assessment of malaria and immunity. This is a translation of an old paper published in Dutch in 1919.

RUSSELL (p 130) in the Gold Coast found that 55.5 per cent. of 600 infants up to 1 year of age showed parasites at a single examination. She therefore administers quinine as a routine to all children brought for treatment.

RUSSELL, MENON and RAMACHANDRA RAO (p 131) show the state of malaria in an area of the Madras Presidency which was not malarious before the inauguration of an irrigation scheme.

GENEVRAY TOUMANOFF and HOANG-TICH TRY (p 131) describe the epidemiological features of an area south west of Tonking where both mountainous and low-lying districts are severely infected. NGUYEN DINH HAO (p 132) shows that although Hanoi is practically free from malaria, endemic foci of *falciparum* infections exist in surrounding villages.

MEUNIER (p 132) discusses epidemics on board ship and urges the necessity for preventive treatment of crews of boats touching at West African ports.

BLAIR (p 133) in Southern Rhodesia found 8 patients with *P. ovale* infection in a limited area where *vivax* and *malariae* infections were also found. The latter two infections are rare since *falciparum* accounts for 96.9 per cent of the total cases. ZIEMAN (p 133) considers that *P. ovale* should be regarded not as a separate species but as a particular form of *P. vivax*. He describes *P. falciparum* subsp. *P. perniciosum* seen in the Cameroons.

EKBLOM (p 134) in Sweden recognizes three races of *A. maculipennis typicus* which occurs inland *messae* the most common, and *atroparvus* which is confined to the coasts. No relation can be found between their distribution and the former incidence of malaria. WEYER (p 134) in Germany also notes that *atroparvus* occurs where the salinity of water is high.

DE MEILLOV (p 135) reports that *A. gambiae* though normally breeding in sunlit pools may in the absence of these breed in completely shaded water for instance in underground cisterns until the rains provide the normal conditions. There is some reason to consider *A. coustani* var. *tenebrosus* a vector of malaria.

CALLOT and RISTORCELLI (p 136) found *A. sergenti* larvae for the first time in a district of Tunis. A description is given. COLLIGNON

(p. 136) in Algiers found *A. maculipennis* and *A. hispaniola* to be very prevalent. LANGERON (p. 136) found *A. claviger* and *A. hispaniola* breeding in the Atlas mountains as high as 8,200 feet. *Vivax* epidemics occur in villages in this area. WALKER (p. 137) found infection of *A. gambiae* and *A. funealis* larvae with a fungus, *Coelomyces africanus* in Freetown. This causes a high larval mortality and may infect pupae and adults.

WEATHERSHEI & HASSELL (p. 137) describes the staining of larvae which persists to the adult stage and may be useful in studying the dispersion of all forms.

STRICKLAND (p. 137) describes a method of preventing the breeding of *A. ludlowi* by preventing the access of sea water to the coastal lagoons in Bengal and Orissa.

KITCHEN (p. 138) examined the reticulocytes in *vivax* infection and found the percentage infected to be much greater than that of adult red cells. Spontaneous termination of the infection took place while the reticulocyte count remained high.

HINGST (p. 138) points out that as sporulation of *P. vivax* takes place in restricted areas of the viscera or bone marrow the percentages of infected reticulocytes and mature red cells in the peripheral blood are not reliable criteria of the conditions where sporulation occurs.

GARCIA (p. 138) found infected red cells in sections of the umbilical veins of the foetuses of two pregnant women who died of malaria. Infected red cells were found in the heart blood (in section) and bone marrow of one of them.

SACK (p. 139) reports instances of long incubation periods in *vivax* infections, one of almost a year.

MAYNE and YOUNG (p. 139) found an apparent antagonism between *P. vivax* and *P. malariae* when both infections are present. In 9 of 12 such cases *vivax* was dominant. Probably more instances of mixed infections occur in nature than are found.

MILAM and KISCH (p. 140) treated 35 patients suffering from general paresis with *P. knowlesi* with 29 responses. The course is usually moderate but severe reactions may occur.

The article by HENRY to which the abstract (p. 141) refers gives recent results obtained by the use of his reaction.

BRISQLESE (p. 141) notes that occipital headache, liver tenderness and circulatory disturbance are found in relapsing fever and may serve to differentiate it from malaria if blood examination is not possible. TADDIA (p. 141) records 3 cases of simultaneous subtertian malaria and relapsing fever. Severe headache during the fever was the principal complaint and the general condition was bad, with severe anaemia.

DESROS and ABILLY (p. 142) describe the characters of acute and chronic nephritis of malarial origin. An increase in the blood urea was frequently found in 28 patients undergoing courses of therapeutic malaria. Renal function should therefore be watched. Quinine is never contra-indicated in these cases.

C IV

COLONIAL DEVELOPMENT FUND (MALARIAL RESEARCH SCHOLARSHIP)

Report of the Malaria Unit, Mombi, 1938 [WILSON (D. Bagster)] — 34 pp. With 5 maps & 9 figs. on 6 plates. 1938. Dar es Salaam Govt. Printer [3s.]

This valuable report is concerned for the most part with a study of malaria in communities in the Northern Province of Tanganyika.

Territory which are either non immune or only partially immune to the disease. Prolonged observations were carried out at Moshi School with a population of 380 of which there are 328 Chagga and 34 Pare. These are non immune hill people of Kilimanjaro. The school is situated at a height of 3 800 feet at the extreme upper edge of the domestic anopheline zone and it is improbable that there is any appreciable amount of malaria transmission. Infection is probably acquired by visits to Moshi town.

Spleen examinations at various parts of the inhabited zone of Kilimanjaro and house searches for anophelines at the end of the rainy season justified the conclusion that there is no endemic malaria in most of this area. No *Anopheles* were caught in houses at over 3 000 feet. In contrast to this Kahe a community of mixed tribes on a river about 2 000 feet above sea level has a spleen rate of 98 per cent.

Information is given of malaria incidence on the sugar estate of Arusha Chini and of the seasonal incidence of malaria among the nomadic pastoral Masai. There is a detailed account of the prevalence of malaria in the township of Moshi and of the measures that have been taken there for the control of the disease. Malaria on estates is the subject of another informative section of the report.

In addition to those previously reported, the following species of *Anopheles* have been found in the Northern Province *gambians*, *nili pretoriensis pharoensis lesoni* and *funestus* var. *reticulorum*. The first three have never been found in houses. *A. pharoensis* was repeatedly caught at Arusha Chini twenty-seven gland dissections were negative. The existence of three members of the *funestus* group *funestus lesoni* and *reticulorum* is of no great practical importance as their breeding places are identical. At Arusha Chini the relative numbers of *gambiae* and *funestus* vary considerably, *funestus* breeding predominates when the furrows are overgrown *gambiae* when there is less vegetation in the furrows. Sporozoite rates for the year varied from 1.4 to 2.3 much lower rates than are found on the coast. The possibility that different biological races may explain different infectivity rates has been studied with special attention to the length of wing of *A. gambiae*. There was no significant difference in infectivity between individuals of greater and lesser wing length but the proportion of long winged individuals increases with a rise in atmospheric humidity. In three localities the higher the infectivity the larger was the proportion of long winged insects.

In his general conclusions the author stresses the need for specialists both European and native being available for malaria control. The value of the regular searching of selected houses for adult mosquitoes as affording an index of the residual anopheline population in controlled areas is underlined. Where malaria is seasonal monthly catches in the off-season and weekly catches in the anopheline season are sufficient.

The only available method of malaria control is anopheline control a method far too expensive to be recommended unless there are strong grounds on which to base the recommendation. The aggregation in a sufficiently endemic locality of a large number of non-immunes necessitates control. It is necessary in townships in most undertakings of a temporary character such as railway construction, on estates which employ a considerable number of non-immune labourers and on railways. With regard to railways which pass through some of the most malarious country in the Territory control

should be established at important stopping places, especially at Mombasa where passengers have to wait during the night for the trains. On the trains themselves the proofing of compartments is advocated. Control is also required in the event of settling non-immune communities in endemic areas. Rapid increase of population in the malaria-free mountain zones may lead to settlement on land in the plains where malaria would become hyperendemic.

With regard to the diagnosis of malaria the examination of blood films, apart from its clinical value helps in the determination of the need for anopheline control. Some interesting remarks are made as to the interpretation of the results of blood examinations of Africans. The finding of a few parasites in a non-immune person means that he is suffering from malaria not so in an immune person. An immune person may suffer from a heavy infection if he moves to a new place but its significance will not be the same as that of a similar infection in a non-immune. The counting of parasites to 100 or 200 leucocytes is of great value.

In treatment, distinction must be made between immune and non-immune Africans. The presence of a few parasites in an adult who has been brought up in a hyperendemic area calls for no treatment. The indiscriminate distribution of quinine in hyperendemic areas should be discouraged. Non-immunes who go from non-endemic to endemic places require special attention. Schoolboys and prisoners are examples. Mosquito nets should be provided. A special record of such persons should be kept so that they may receive particular attention if attacked. Infants in hyperendemic areas require some protection but no measures should be taken to prevent their acquiring immunity. Weekly parasite counts were made on a group of 20 infants at Arusha Chini. Whenever the parasite count rose to 10,000 per cmm. they were given the equivalent of a 10 gram adult dose of quinine on each of two days. This reduced the parasite count greatly but hardly ever to nil. None of these children has been dangerously ill and the constant presence of parasites would seem to indicate that the development of immunity was not being interfered with.

Norman White

FEDERATED MALAY STATES. Annual Report of the Malaria Advisory Board for the Year 1937 (KINGSBURY (A. Neave) Chairman)—19 pp. With 4 charts. 1938 Kuala Lumpur F.M.S. Govt. Press

The number of admissions for malaria to Government and estate hospitals is admittedly an imperfect indication of malarial conditions in any given year but it is the only one available in the Federated Malay States as in many other places. The estate populations vary with the prosperity of the rubber industry. The prejudice of the kampong population against hospitalization is gradually declining. During 1937 the total number of malaria cases admitted to hospital numbered 35 483. If the number of hospitalized cases in 1933 be represented by 100 the corresponding ratios for the four succeeding years are 97, 138, 118 and 154. Factors referred to above played an unknown part in the apparent considerable increase of malaria prevalence. meteorological conditions and the immigration of large numbers of non immune labourers also contributed. The replanting of rubber was undertaken on a much larger scale than in the two preceding

years an operation that on certain estates was associated with a marked increase in anopheline breeding. Increased prevalence was least marked in Perak and most in evidence in Pahang where the number of cases treated in estate hospitals increased from 598 in 1936 to 1,393 in the year under review. Seven cases of blackwater fever were reported four of which were from Pahang. The case mortality rate was 2.2 per cent. as in 1936. As usual February and March were the months of lowest incidence the April to June peaks in the malaria curves of the four States approximated to those of the previous year. The main increase in the 1937 prevalence occurred from August onward.

Further work on testing remedies for malaria was carried out. Totaquina Type II was found as effective as quinine its cost is only half that of quinine hydrochloride. A remedy called

Malarene a proprietary preparation (not the standardized cinchona product prepared in Madras which bears the same name) was tried on 32 patients and found to be much less effective than quinine. A small sample of another proprietary preparation Homaline I was tried on five patients without success. Paludex (quinine and sodium di sulphonate of cupreous oxyquinoline) of which favourable reports have been published from the Belgian Congo is being tried on a series of cases. Paludex alone does not control the parasites and fever of local strains of *P. falciparum* it appeared to have less effect than quinine on *falciparum* gametocytes. Paludex plus quinine appeared to be no more effective than quinine alone.

The year's work has shown that 0.3 gm. of atebuin weekly suffices for the effective control of clinical malaria.

The anopheline survey of part of the Selangor coast area continued. In Rantau Panjang the percentages of total anophelines caught in a human bait trap and cattle sheds respectively were *A. barbirostris* 15 and 1. *A. hyrcanus* var *sinensis* 29 and 69. *A. sundicus* 51 and 5. Both *barbirostris* and *sundicus* appear to have a marked preference for human blood.

Investigations of anti malarial larvicide oils continued.

Where drains are liable to be attacked by acid water cement Fondu has given satisfactory results. In such places where new drains are required glazed channels are inset in the inverts.

Experimental control of *A. maculatus* breeding by shading has not yet proved very successful.

N IV

SCHÖFFNER (W. A. P.) Two Subjects relating to the Epidemiology of Malaria.—*Jl Malaria Inst of India* 1938. Sept. Vol. 1 No 3 pp. 221-256. With 6 diagrams. [28 refs.]

This paper was originally published in 1919 in Dutch [see this *Bulletin* 1920 Vol. 16 p. 317] it was accompanied by an English translation which though inadequate and not free from ambiguity enabled the student of malaria unacquainted with the Dutch language to realize that a classical contribution to the literature of his subject had been made. The Malaria Institute of India has rendered a valuable service to English readers by republishing an excellent translation of the original paper. There can be but very few contributions to the epidemiology of malaria written 20 years ago that have retained their freshness and up-to-dateness as this has done. It still affords stimulating reading.

An adequate summary of the paper would require much space. It should suffice to remind the reader of its nature and scope. It is based largely on observations which the author carried out for two years in Mandailing an intensely malarious locality in the Netherlands East Indies where the average individual was being infected at least four times a year where the disease had been rampant for several generations at least where malaria transmission occurred all the year round and where the total mortality approximated 45 per thousand of the sickly population, a rate but very little less than the birth rate. As a contrast to these conditions the findings of Dr and Mrs. SWELLENGREBEL in Sundatar (Sumatra) [see this *Bulletin* 1920 Vol. 16 p. 318] during an epidemic of malaria in villages that had previously suffered but little if at all from that disease are discussed.

The first part of the paper deals with the importance of determining the spleen rate and the limits of its usefulness. This includes a discussion of the correlation between splenomegaly and the presence of malaria parasites in the blood the deductions that may be drawn from the age distribution of splenomegaly as to the indigenous nature of the disease the density of infection or the number of times each individual is likely to be infected in a given area in a given time in relation to splenomegaly. The determination of the spleen rate is of great value if the examination is carried out according to fixed rules if the degree of splenic enlargement is recorded and if adults are included in the survey. It also facilitates the interpretation of other data. As a simple method of orientation in new surroundings and as an indicator of changes in malarial conditions the method has no equal but blood examinations are also indispensable.

The second and perhaps the most valuable part of the paper is concerned with observations regarding immunity arising from a study of the parasite content of the blood in a malarious population. The parasite picture in an acute epidemic is contrasted with the parasite picture under chronic endemic conditions. Most if not all, of the deductions and interpretations are now current in malaria literature but they have never since been better presented. N IV

RUSSELL (Beatrice A S) Incidence of Malaria among African Children.—*Trans Roy Soc. Trop Med & Hyg* 1938 Aug 25 Vol. 32 No. 2 pp. 237-242.

The writer of this paper has had twelve years experience of medical work among the women and children of the Gold Coast. She has found that malaria is excessively prevalent among infants during the first year of life though the symptoms and clinical signs are frequently ill-defined. This excessive prevalence led her to adopt the practice of giving quinine to all children brought for treatment. During three months in 1937 the blood of 600 infants without selection, aged from 11 days to 1 year who were brought to the clinic in Kumasi, Ashanti, for the first time was examined. Though but a single examination was made of each child 55.5 per cent. were found infected. There was a palpable spleen in 41.3 per cent. Only 12.6 per cent. had temperatures of 100°F or over. Anaemia judged by pallor of mucosae or polychromatophilia and anisocytosis, was noted in 23 per cent. The highest infection rate, 73 per cent. was in the 3 to 6 months age group.

in the less than 3 months age group it was 36 per cent. The writer considers that the results of this investigation justify the routine administration of quinine which she has adopted. N IV

RUSSELL (Paul F) MENON (M Kumara) & RAMACHANDRA RAO (T)
Epidemiology of Malaria in Pattukkottai Taluk, Tanjore District,
Madras Presidency, India.—*Jl Malaria Inst of India* 1938
Sept Vol 1 No 3. pp 285-326 With 6 graphs 1 fig & 1
map

Pattukkottai is a revenue division in the southern part of the Tanjore District extending southward to Palk Strait which separates it from the north west extremity of Ceylon. It covers an area of 434 000 acres and has a population of 279 000. There are 474 villages there are only 4 towns with populations exceeding 5 000. It is a dry level tract devoid of hills. It was not malarious prior to the inauguration of an irrigation scheme part of the Mettur-Cauvery project in 1933. Increased value of land and crops is being paid for in malaria. The observations recorded in this preliminary report extended from July 1936 to March 1938. It is a well documented report.

Twelve species of *Anopheles* were collected—*aconitus annularis barbrostris culicifacies hyrcanus* var *nigerrimus jamezi pallidus stephensi subpictus tessellatus vagus* and *varuna*. *A. culicifacies* is the only effective carrier (13,335 dissections made) but not an energetic one. the oöcyst index was 0.07 per cent (5 676 guts examined) and the sporozoite index of 6 483 glands dissected was 0.08 per cent. Though a house frequenter only 0.25 per cent. gave a positive human precipitin reaction. It breeds in irrigation water. There is an absence of drainage canals for irrigation water and irrigation has very markedly raised the subsoil water level.

Four thousand five hundred spleen examinations and blood smear examinations were made in 40 villages. For the taluk as a whole the spleen index is over 40 per cent. the parasite index over 30 per cent and the gametocyte index over 13 per cent. The spleen index and the parasite index for boys 39.7 and 32.3 per cent. were significantly greater than for girls 30.3 and 21.9. More than half of the children with spleens palpable only on deep inspiration harboured malaria parasites. About two-thirds of the infections were *falciparum* and somewhat less than a quarter *vivax*. A slightly greater percentage of *falciparum* infected children had palpable spleens than had *vivax* infected children. It is possible that malaria may be transmitted in any month of the year but there is evidence of a malaria season extending from July to January when the chances of contracting infection are considerably greater than in the remaining five months of the year. N IV

GENEVRAV (J) TOUMANOFF (C) & HOANG-TICH TRI Contribution
à l'étude du paludisme au Tonkin. (Sites des récifs calcaires de
la région du Sud-Ouest.) [Contribution to the Study of Malaria in
Tonking Region of Calcareous Ridges in the South-West].—
Rev Méd Française d'Extrême-Orient. 1938 Mar Vol 16
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In Tonking and in the basin of the Red River generally there are five more or less well-defined regions in which physiographic conditions vary considerably variations which influence the anopheline fauna and

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GENEVRAI (J) TOUMANOFF (C.) & HOANG-TICH TRY Contribution à l'étude du paludisme au Tonkin. (Sites des récifs calcaires de la région du Sud-Ouest.) [Contribution to the Study of Malaria in Tonking Region of Calcareous Ridges in the South-West.]—*Rev Méd Française d'Extrême-Orient* 1938. Mar Vol. 16 No 3 pp 161-169 [12 refs]

In Tonking and in the basin of the Red River generally there are five more or less well-defined regions in which physiographic conditions vary considerably variations which influence the anopheline fauna and

malaria incidence alike. These are the sea coastal region the deltaic region the middle region with rounded hills, the upper mountainous region and the high mountain region above 600 metres. Yet another area with special malaria characteristics is the subject of this report. It lies to the south-west of Tonking and includes parts of the provinces of Hoa Binh and Ninh-Binh. It consists of a series of calcareous ridges rising from land that is little if anything above sea-level and which formerly rose from the sea. None of them exceeds 800 metres in height. In places rounded hills with gentle slope alternate with the characteristic calcareous ridges. The old alluvial soil is fertile and rice-fields and coffee plantations are the source of the wealth of this corner of Tonking. There are agricultural communities of some importance. There are numerous streamlets and collections of standing water favourable for anopheline breeding.

Epidemiological data were collected in three communities. The splenic index varied from 56 to 83 per cent, the parasite index from 28 to 68 per cent. *P. vivax malayensis* and *falciparum* were all found, *falciparum* greatly preponderating. Malaria is in fact as severely prevalent in this low-lying area as in the high mountainous region and it is with difficulty that Annamite labour can be acclimatized to the conditions. All the anophelines found in the mountainous region were found here too *aconitus barberostrius fuliginosus hyrcanus* var *sinensis jeyporiensis* var *tonkinensis hartwegi hocki maculatus maculipalpis minimus philippinensis tessellatus* and *vagus A. minimus jeyporiensis* and *aconitus* together formed more than 50 per cent of the total number caught. The two former are the two chief vectors of Tonking. As in the high regions *A. minimus* was most prevalent during the dry season though larvae were numerous also during the rains May to September. *A. jeyporiensis maculatus* and to a less degree *aconitus* are also dry season mosquitoes. For some reason unknown *A. vagus* was relatively rare. One specimen of *A. aconitus* was found infected, out of 358 dissected in the dry weather. zoophile tendencies explain the normal unimportance of this species as a vector. The infection rate of *A. minimus* for all seasons was 6.45 per cent. an infection rate higher than that found in many parts of the mountainous region. N IV

NGUYEN DINH HAO. Note sur le paludisme à Hanoi et les environs. [Malaria in Hanoi and Neighbourhood.]—*Bull. Soc. Méd.-Chirurg. Indochine* 1937 Dec. Vol. 15 No. 10 pp 1191-1195.

Hanoi is practically free from indigenous malaria but in the outskirts of the town are several endemic foci, the most important of which is the *Banc de sable* a group of villages housing upwards of 20 000 people. Here malaria is contracted with frequency the majority being *falciparum* infections. N IV

MEUNIER (R.) Au sujet des "épidémies nautiques" de paludisme. [Malaria Epidemics on Board-Ship.]—*Bull. Office Internat. d'Hyg. Publique* 1933. July Vol. 30 No. 7 pp 1563-1565

A cargo boat loaded with ground-nuts left Ziguinchor on the 19th October. When she touched at Gibraltar on the 31st of October there were cases of fever on board. On the 3rd of November she was forced to put into Algiers as 13 of a total strength of 17 officers and

crew were down with fever. Blood examination revealed *P. falciparum* in 12 cases. In two of these cases *falciparum* was associated with *malariae*. There were no deaths though six of the cases were very severe attacks. The author urges the necessity for serious preventive malarial treatment for the crews of boats touching at West African ports between May and January. N W

BLAIR (D. M.) Infections with *Plasmodium ovale* Stephens in Southern Rhodesia.—*Trans Roy Soc Trop Med & Hyg* 1938 Aug 25 Vol. 32, No. 2. pp 229-236 With 3 charts & 24 figs.

The examination of a large number of blood films in connexion with a trypanosomiasis inquiry revealed eight cases of infection with *P. ovale*. All the cases were in people from a limited area on the Umtati River between the confluence of the Umtati and Ingondomo Rivers and Robb's Drift. The parasite as figured and described conforms in all respects with the original description of STEPHEN and OWENS. Measurements of red cells in one case show that *ovale* infection causes but very slight enlargement much less than does *vivax*. It is interesting to note that in the area in which these cases were found a few cases of *vivax* and *malariae* infection were also seen. Both these species are rare in Southern Rhodesia where *falciparum* was found in 96.9 per cent. of the positive blood films examined in Government laboratories.

N W

ZIEMANN (Hans) Zum Problem der Bildung verschiedener Rassen Varietäten oder Spezies bei den Malaria parasiten. [The Problem of the Development of Different Races, Varieties or Species of Malaria Parasites.]—*Zent f Bakt I Abt Orig* 1938. Oct. 17 Vol. 142. No 7/8. pp 366-373 [26 refs.]

This paper is an expanded version of a lecture given by the author at the International Malaria Congress at Amsterdam, September 1938. He accepts the three species of malaria parasites *P. vivax*, *P. malariae* and *P. falciparum* as definite and the transformation of one species into another can be ruled out. Some workers have regarded *P. tenue* and *P. ovale* as separate species. The author has earlier viewed these as particular forms of *P. vivax* or *P. falciparum* with which they were always found. The species nature of *P. tenue* is generally denied but *P. ovale* finds more support among malarialogists as a definite species. As far as the author is aware there is no region where *P. ovale* is found exclusively and he decides against the species nature of this parasite quoting in support the reversal to *P. vivax* type when inoculation experiments were performed with the so-called *P. ovale*. The *P. camarensis* of the author also named *P. vivax* var. *minutum* Emm has recently been identified with *P. vivax*. Different strains of *P. vivax* are accepted by the author for example the Dutch and Madagascar strains, and the absence of such differentiation in the case of *P. malariae* is noteworthy. Attention is drawn to some of the findings of earlier workers with *P. falciparum* whose descriptions agree apparently with those for pigmentless forms described by RAFFAELE and JAMES.

Different forms showing alteration in the life-cycle have been isolated from *P. falciparum* by various workers. From his observations in 1896 the author designated such a form as *P. falciparum* var. *perniciosum* and in his view it should now be called *P. falciparum* subsp.

P. perniciosum. Such forms in freshly infested patients showed a marked virulence. He points out that if definite species varieties or strains are to be separated a standard technique, which he outlines must be followed and consideration must be given to the general picture including morphology immunobiological reactions and clinical findings. The author describes his findings in regard to the suggested subsp *P. perniciosum* seen in the Cameroons. The appearance of schizonts and half-moon forms in the peripheral blood, character of pigment colour of infected red cells number of merozoites, absence of crescents size of ripe oöcysts resistance to quinine and clinical manifestations with special reference to blackwater fever are dealt with. Support for his views is adduced from a recent description of an Ethiopian variety of *P. falciparum*. Further examples of definite differentiation of the species *P. falciparum* are cited from the literature.

[STEPHENS (1922) described what he considered to be a new species of malarial parasite and proposed the name *P. ovale*. Later he confirmed the description of it from another source. YORKE & OWEN (1930) showed that the morphological features of this parasite remain constant when infection is carried on by blood inoculation. JAMES *et al.* (1932) transmitted it through *Anopheles maculipennis* without any changes in character. They considered *P. ovale* without doubt a separate species. In 1933 the same authors write after marshalling all the facts that there is in reality no disputable question concerning the nomenclature of *P. ovale*.]

J. D. Fulton.

EKBLOM (Tore). Les races suédoises de l'*Anopheles maculipennis* et leur rôle épidémiologique. [Deuxième communication.] [Races of *A. maculipennis* in Sweden.]—*Bull. Soc. Path. Exot.* 1933. July 6. Vol. 31 No. 7 pp. 647-655 With 3 figs.

This is a re-investigation of the races of *Anopheles maculipennis* occurring in Sweden in the light of the changes in nomenclature that have been made since the publication of an earlier communication [see this *Bulletin* 1935 Vol. 32 p. 812]. The author now recognizes three races (i) *A. typicus* which occurs only inland and usually in low-lying country. This race extends its range farthest to the north. (ii) *A. messiae* which is the most common and widely distributed form. (iii) *A. atroparvus* (called *labronckiae* in the earlier paper) which is the most restricted form, confined to the coasts. This distribution is attributed in part to the greater salinity of the water in part to the higher temperature. No relation can be established between the present distribution of these races and the former incidence of malaria in Sweden.

V. B. Wigglesworth.

WEYER (Fr.) Die geographische Verbreitung der Rassen von *Anopheles maculipennis* in Deutschland. [The Geographical Distribution of the Races of *A. maculipennis* in Germany.]—*Ztschr. f. Parasitenk.* 1933 Oct. 17 Vol. 10 No. 4 pp. 457-463 With 6 figs. [25 refs.]

The author gives a full account of the distribution of races of *Anopheles maculipennis* in Germany including the relative abundance of the races in many of the localities.

In Germany *atroparvus* is exclusively coastal and often limited to a zone only a few miles wide but it also occurs away from the coast in spots where natural waters have a rather high salt content. The relation of larva to salinity is not a simple one. The only other races found are *messeae* and *typicus* the latter rare.

The paper includes a large number of measurements of salinity (particularly of water in which *atroparvus* breeds) and descriptions with photographs of breeding places which are typical of different races. Information on breeding places of *A. claviger* (*bifurcatus*) is included.

P. A. Buxton

VERI (F) & GRATCHI (I) Distribuzione delle razze anofeliniche nelle zone malariche della provincia di Ravenna [Distribution of Anophelines in Ravenna].—*Riv. di Malarologia* Sez. I 1938. Vol. 17 No 4 pp 242-261 With 1 map & 2 figs. [24 refs.] English summary (9 lines)

DE MEILLON (Botha) A Note on *Anopheles gambiae* Giles and *Anopheles coustani* var *tenebrosus* Donitz from Southern Africa.—*South African Med. J.* 1938. Sept. 10 Vol. 12. No 17 pp 648-650

(a) *Anopheles gambiae* as a domestic breeder

A. gambiae is well known in Africa as a breeder in sunlit pools. In this short paper the author reports the finding of larvae in the island of Mozambique in rainwater stored in total darkness in two large closed, concrete underground cisterns and one larva in water kept in a barrel in a house.

At the time of the author's two-day visit there were only two open pools on this small built-up island, both were brackish and contained no larvae.

In Kenya SYMES has recently reported the finding of the larvae of *A. funestus* in almost similar domestic situations.

The author concludes that in the island of Mozambique *A. gambiae* in the absence of normal breeding places resorts to these completely shaded underground cisterns. He suggests that the species is thus kept alive until the arrival of the rains and the preferred breeding places are again available.

(b) *Anopheles coustani* var *tenebrosus* as a possible vector of human malaria.

This mosquito is common in the marshy coastal regions of Natal, Zululand and Portuguese East Africa where the following observations were made.

Precipitin tests on blood meals of female *tenebrosus* taken from a cattle shed occupied at night by 14 cows and several natives showed bovine reactions only. A solitary *A. funestus* was taken in the cattle shed but in a hut nearby *A. funestus* and *A. gambiae* were plentiful. Precipitin tests on these malaria vectors showed no bovine reaction. Men living in the open and in a tent near the breeding places of *tenebrosus* were constantly bitten by this mosquito mainly between 6 and 7 p.m. Female *tenebrosus* fed readily in the laboratory on a human volunteer though none became infected.

The author's main conclusions are that *A. funestus* and *A. gambiae* failed to locate the men in the cattle shed because of the overpowering presence of the cattle that *tenebrosus* though zoophilic will attack

man in the absence of cattle and that the evidence so far that *Leucoborus* is not a vector of malaria is inconclusive. He suspects that as this variety is common in the winter months when the normal vectors are inactive *Leucoborus* may play a part in the propagation of winter malaria.

H S Leeson

CALLOT (J) & RISTORCELLI (A.) Localité nouvelle pour *Anopheles (myzomyia) sergenti* Theobald, 1907 [New Locality for *Anopheles sergenti*.]—*Arch Inst Pasteur de Tunis* 1938, Mar Vol. 27 No. 1 pp. 105-107 With 4 figs.

This reports the finding of *A. sergenti* breeding in the oasis of Mansoura, six kilometres from Kebili in Tunisia the first occasion on which this relatively rare, but widely distributed, North African species has been reported from this locality. The larvae were found in a small shallow swamp under palm trees and were therefore relatively shaded for a great part of the day. The swamp contained an alga, *Cladophora fruticosa* and a reed *Phragmites communis* and was edged with *Limonium delicatulum*. Attention is called to characteristics easily recognized serving to distinguish the larva of *A. sergenti* from those of *multicolor* and *hispaniola* which are much more common in Tunisia: a palmate hair on the first abdominal segment and a very distinct palmate hair on the metathorax. The palmate hairs of the abdomen are remarkably long and slender. The adult females are easily identified by the wide white band on the palps.

N II

COLLIGNON (E.) Observations sur les gîtes à larves d'anophèles en Algérie (1937) (département d'Alger) [Observations on Anopheline Breeding Places in the Department of Algiers during 1937].—*Arch Inst Pasteur d'Algérie* 1938, June, Vol. 16, No. 2 pp. 157-160. With 1 fig.

This paper records the place and date of the first findings of the larvae of anophelines in the Department of Algiers during 1937 following an abnormally dry cold season. *A. maculipennis* is ubiquitous. *A. hispaniola* is likewise very prevalent and *algeriensis bifurcatus* and *marleri* also occur. Breeding began later than usual and breeding places were less numerous.

N IV

LANGERON (Maurice) Anophèles du Grand Atlas et de l'Anti-Atlas marocains [Anophelines in the Atlas Mountains, Morocco].—*C R Acad Sci* 1938, July 18, Vol. 207 No. 3, pp. 260-262.

Two species of Anophelines *A. claviger* and *A. hispaniola* were found breeding in grassy pools in the high valleys among the Atlas Mountains at altitudes as great as 2,500 m. (8,200 feet). These regions are covered with snow for more than half the year. At the time of the author's visit some of the villages in these valleys were suffering from epidemics of malaria caused by *P. vivax*.

V B Wigglesworth.

SEW (P) On Some Physico-Chemical and Vegetation Factors of the Breeding Places of *Anopheles sudanicus* Rodenw.—*Jl Malaria Inst. of India* 1938, Sept Vol. 1 No. 3, pp. 257-260.

WALKER (A J) Fungal Infections of Mosquitoes, especially of *Anopheles costalis*—*Ann Trop Med & Parasit* 1938 Oct. 12 Vol. 32. No 3 pp 231-244 With 2 diagrams & 2 plates. [14 refs.]

The author reviews previous work on fungal infections in mosquito larvae and describes a new species which is not rare in Sierra Leone in *Anopheles* species.

Fungi here described as *Codomyces africanus* are rather often to be found in larvae less often in pupae and adults of *Anopheles gambiae* [referred to as *A. costalis* in the title] and *funedus* in and near Freetown. The organism causes a very high mortality in larvae, when a light infection occurs in an adult female the fungus is confined to the ovaries and eggs do not develop.

The fungus (fungi?) gives rise to four types of sporangia. It is not clearly established that they belong to a single species of organism and on the mycological side much more work appears to be desirable.

P A Buxton

WEATHERSHEE (Albert A.) & HASSELL (Philip G) Mosquito Studies. On the Recovery of Stain in Adults developing from Anopheline Larvae stained in Vitro.—*Amer J Trop Med* 1938 Sept Vol. 18 No 5 pp 531-543

The authors put larvae of mosquitoes in dilute stains. This colours some of the internal organs and the dye persists through the pupal into the adult stage. This might be a valuable method of studying the dispersion of larvae pupae or adults.

A number of microscopic stains have been tried and the result is said to be highly satisfactory. With certain stains the colour in the underlying tissues may be seen in a living adult sometimes it can only be found by dissections. The most satisfactory stains are Giemsa's, Wright's methylene blue and Congo Red. They are used very dilute for a long period. For instance Giemsa stock solution is diluted 1/250 and larvae left in it 3 days every adult was unmistakably stained and one remained so 39 days after emergence. The larval mortality with these stains was not great. P A Buxton

STRICKLAND (C.) Malaria in Relation to the Coastal Lagoons of Bengal and Orissa.—*Indian Med Gaz* 1938 July Vol. 73 No 7 pp. 399-402. With 2 maps & 4 figs. on 1 plate.

The author describes lagoon formation shallow expanses of water shut off at times of low water from the river or sea-currents by a bank while they are flooded over at times of high water. As examples Chilka Lake on the coast of Orissa and a lagoon at Chatrapur are described. If these coastal lagoons contain water rendered brackish by communication with the sea *A. ludlowi* may breed in abundance and severe malaria result. If on the other hand they be banded up receiving only fresh water the resultant expanse of shallow sweet water supporting dense aquatic vegetation does not breed malaria carrying anophelines.

N IV

KITCHEN (S F) The Infection of Reticulocytes by *Plasmodium vivax*
—*Amer J Trop Med* 1939, July Vol. 18 No 4 pp. 347-
359 With 2 charts. [12 refs.]

The observations recorded in this paper were made on two patients inoculated for therapeutic purposes by mosquitoes infected with *P. vivax*. Neither case had any antimalarial medication. One patient after an incubation period of 12 days, had daily paroxysms for 54 days, 28 of which were accompanied by chills. Reticulocyte smears were examined daily from the 7th day of the disease. The second patient, after an incubation period of 13 days had 44 paroxysms during 46 days, with 20 rigors. Reticulocyte smears were examined from the 6th day of illness till the 4th day after the last paroxysm. The reticulocyte preparations were made by the dry slide method using Wright's stain (Grubler) in place of brilliant cresyl blue. The smears were made within an hour of the termination of the chill or if there were no rigor during the elevation of the temperature. Total red cell counts, haemoglobin estimations and total parasite counts were also made. Reticulocytes and parasitized cells were enumerated, and the age of the parasite and the type of cell infected whether reticulocyte, mature erythrocyte or an erythrocyte containing Schüffner's dots were noted. The percentage of reticulocytes infected was much greater than that of adult red cells. In about three-quarters of the observations the actual number of infected reticulocytes exceeded the number of infected adult red cells. Multiple infections were more numerous in reticulocytes. In both these untreated cases there was a marked increase in the number of reticulocytes above normal limits during the latter part of the infections. anaemia is inevitable in uninterrupted infections of two weeks duration. The infections terminated spontaneously while the reticulocyte counts remained at very high levels. A IV

HIGGS (H E) Erythrocyte Susceptibility to *Plasmodium vivax*
Grassi and Feletti, 1890.—*Amer J Trop Med* 1939, July
Vol. 18 No 4 pp. 361-372 With 3 graphs.

This paper combats the theory originally put forward by EASTON that the red cells are susceptible to invasion by malaria parasites only during the reticulocyte stage. The author points out that sporulation of *P. vivax* takes place largely in restricted areas of the viscera or bone marrow. It follows therefore that the percentages of infected reticulocytes and mature red cells in the peripheral blood are not reliable criteria of the conditions where sporulation occurs. Multiple infection of red cells is not frequently observed except in infections with certain strains of *P. vivax*. In these strains the author believes that amitotic division of the parasites is responsible for this multiple infection. A IV

GARCIA (Eusebio Y) Can Malaria be contracted In Utero?—*Jl Philippine Islands Med Assoc.* 1938 Mar Vol. 18, No 3.
pp. 141-146. With 8 figs on 4 plates.

The post-mortem findings of two cases are recorded. A woman six months pregnant died of cerebral malaria. Her blood immediately before death contained numerous ring forms, some old trophozoites and a few schizonts of *P. falciparum*. The post-mortem examination

was made two hours after death. Sections of the placenta showed an enormous number of infected red cells in the intervillous spaces some 90 per cent of the red cells were infected. A few infected red cells were seen in the vein of the cord. The second case was that of a woman four months pregnant who also died of cerebral malaria. Sections of the cord showed infected red cells in the umbilical vein. Sections of the foetal heart showed a large number of infected red cells in the heart chambers and in the myocardial vessels. Numerous phagocytes laden with pigment were also seen in these sections. Similar findings resulted from the examination of the bone-marrow of the femur and the femoral vessels. Reference is made to the literature concerning possible congenital infection in malaria [See also this *Bulletin* 1933 Vol 30 pp 474-475 1934 Vol 31 pp 419 427 689 1935 Vol 32 pp 125 126 408 838 1936 Vol 33 pp 225 229 264 783] N II

SACK (Georg) Beitrag zur Malaria mit langer Inkubationszeit [Malaria with Long Incubation Period.]—*Arch f Schiffs u Trop Hyg* 1933 Nov Vol. 42. No 11 pp 503-506 [11 refs]

The author records the history of a boy (F H) of 16 years of age who went from Germany for a holiday in Italy along with a party of boys. They arrived in Terranova Sardinia on 3rd August 1935. There the boy was severely bitten by insects in the night as he was sleeping in the open. He felt seedy the next day but was quite fit on the following day and was not again sick. Another boy of the party fell sick on the same day with vomiting and fever and was under treatment for 12 days and joined the party later. The boys returned home on 28th August 1935. Eight to ten days after the return one boy of the party G was attacked with malaria in Saarbrücken. The author's patient remained well till the summer of 1936. In July he became ill and on the 29th had an attack of fever and examination of his blood showed the presence of *Plasmodium vivax*. The febrile attacks were severe. He was treated with atehrin and plasmoquine in the usual way and three months afterwards the spleen which was considerably enlarged during the attack was no longer palpable. He had no relapse. The author discusses fully the views held regarding prolongation of the incubation period of malaria and refers to JAMES's work on the occurrence of sporozoites in the reticulo-endothelial system. He inclines to the view that the prolongation in his case was due to the small number of parasites introduced at the time of infection.

E D W Craig

MAYNE (Bruce) & YOUNG (Martin D) Antagonism between Species of Malaria Parasites in Induced Mixed Infections. (Preliminary Note).—*Public Health Rep* 1933, July 29 Vol. 53 No 30 pp 1289-1291

In the State Hospital Columbia SC tertian malaria is used in the treatment of white paretics and quartan in the treatment of Negroes many of whom are immune to tertian. The two species combined were used in the treatment of 16 white and 4 Negro paretic patients. Intravenous injection of 5 to 10 cc of blood was the method of

DEANOS (E. H.) & ABELY (Paul) Le syndrome rénal d'origine paludéenne [Renal Syndrome of Malarial Origin.]—*Rev Méd. et Hyg Trop* 1938 July-Aug Vol. 30 No 4 pp 207-223. [23 refs.]

In the course of several sojourns in Senegal the Sudan and the Ivory Coast the first named author has frequently seen cases of acute and of chronic nephritis of malarial origin. The acute forms are of sudden onset and characterized by high temperature generalized pains most marked in the lumbo-sacral region facial oedema, cerebral symptoms such as convulsions or aphasia occasionally slight dilatation of the pupils, often slight yellowish discoloration of the conjunctivae never vomiting but sometimes regurgitation of acid liquid and very occasionally ascites. The urine is scanty albuminuria is generally slight but occasionally reaches 1.50 gm. Esbach. Most cases react favourably to theobromine associated with small doses of quinine.

The chronic forms are insidious in onset. There is a history of attacks of fever which have been more frequent prior to the appearance of nephritic symptoms. Theobromine-quinine generally effects an improvement though its action is much slower than in the acute cases. Six illustrative cases are described.

The second part of the paper discusses the nature of these cases in the light of observations of patients submitted to malaria therapy with *P. vivax*. In these cases it was not uncommon to find that the blood urea rose as the malaria progressed. Thus in the first observation quoted the blood urea at the time of the 4th febrile attack was 0.35 gm. at the time of the 9th attack it had risen to 0.75 gm. This phenomenon was not quite constant but it occurred with great frequency among the 28 observations recorded. It is important for the doctor treating cases of malaria to watch the renal functions of his patient and more particularly the urea content of the blood. The neurologist should also pay attention to these matters before submitting his patient to malaria therapy. Quinine is never contra indicated in these cases. It acts favourably on the malaria as well as on the renal condition to which the malaria has given rise.

N IV

HELMINTHIASIS PRÉCIS OF ABSTRACTS IN THIS SECTION

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- GAUST *et al* (p 144) estimated the numbers of protozoan cysts and helminth eggs in faeces by various methods. Direct counting in iodine solution of known volumes of the material and the centrifugal flotation method using zinc sulphate solution of specific gravity 1.180 gave the highest readings. HSÜ and CROW (p 144) give the numbers of helminths (chiefly nematodes) found in 809 autopsies in Peiping. MARSEILLE (p 145) in Batavia found that compared with an investigation carried out by FLE in 1918 the incidence of ankylostomiasis has lessened but that of ascariis and trichurias is unchanged.
- SCHAPIRO, CROSBY and SICKLER (p 146) checked the Bachman intracutaneous skin test for trichiniasis against the post mortem examination of 30 per cent of patients so tested finding a close correlation between the two [see also this *Bulletin* 1928 Vol. 25 pp 470 963 and 1929 Vol. 26 p 551]. ROTH (p 146) found the site of election of adult *Trichinella* in the guinea pig to be near the junction of the small and large intestines and JENSEN and ROTH (p 147) show that larvae actively bore into striped muscle fibres. ROTH (p 147) examined various muscles of guinea pigs fed with larvae in definite numbers. Twenty per cent of the larvae were found in the masseters diaphragm and legs.
- BACHMAN (p 147) considers that in some worm infections there is produced a localized immunity both humoral and cellular. Absence of eosinophilia in the peripheral blood in the later stages of experimental trichinella infection of pigs may be due to the accumulation of these cells in the intestinal mucosa. [The reader may refer here to BLACKLOCK and GORDON's experiments on metazoan immunity carried out a decade ago. See this *Bulletin* 1927 Vol. 24 p 881 and 1928 Vol. 25 p 252.] CULBERTSON and KAPLAN (p 148) recognize passive immunity conferred upon mice by specific immune serum from rabbits. The antibody appears to act against ingested maturing larvae in the intestines.
- ITYENGAR (p 148) shows that in Travancore *Mf. malayi* is more widely prevalent than *Mf. bancrofti* and is a rural infection. It is transmitted by *Mansonioides annulifera* which depends for larval development on the waterplant *Pistia stratiotes*. The elimination of this plant is an effective measure of control.
- POYNTON and HODGKIN (p 149) give the percentages in which elephantiasis and microfilariae in the blood were found in a community in the Federated Malay States. The endemic infection is with *Mf. malayi*. They discuss the relationship between the probable spread of lymphangitis which is apt to occur at monthly intervals. They also discuss elephantiasis intradermal tests and the prevention of filariasis.
- GALLIARD (p 150) reports that larvae of *M. bancrofti* reached the infective stage in *Aedes aegypti*. YAO WU and SUN (p 150) found various forms of *Mf. bancrofti* in 28 sandflies dissected at different periods after infective feeds. Complete metamorphosis was not obtained probably owing to the early death of the sandflies.
- O'CONNOR and KNOTT (p 151) describe the pathological appearance in an excised varicose groin gland. These did not support their former conclusions that parturition in the adults is simultaneous and occurs about noon.

KNOTT (p 152) has had success in the treatment of elephantiasis of the leg by pressure first by means of a bandage boot and later when the condition has improved, by a supporting legging. It is not necessary to remove these during an attack of lymphangitis. For the acute inflammation which often follows surgical interference in elephantiasis CHAREUP (p 153) has used septasine with success.

YEN (p 154) gives the results of a study of the development of the larvae of *Dirofilaria immitis* in various species of Anopheles, Culex and Aedes. It was completed most frequently in the anophelines. KUBO (p 155) found a seasonal as well as a daily periodicity in *Mf immitis* in two dogs in Peiping.

ANDERSON and LEUCHER (p 155) report the first autochthonous case of cutaneous onchocerciasis in Tunisia.

SOUTHWELL and HIRSCHNER (p 155) detail observations made on the development of guinea-worm larvae in *Cyclops vernalis* under laboratory conditions.

WRIGHT (p 155) considers that the eggs of *Hapaticola hepatica* seen in the faeces of 16 persons in Panama were present through contamination. DAENGSVANG and TANSURAT (p. 156) give frog, fish and eel hosts of *Gnathostoma spinigerum*. FRICKERS (p 156) gives the incidence of various helminths (of which *Ancylostoma caninum* was the most common) in 400 dogs destroyed in Surinam. C IV

FAUST (Ernest Cartoll) D'ANTONI (Joseph S.) ODOM (Ada) MILLER (Max J.) PERES (Charles) SAWITZ (Will) THOMEN (Luis F.) TOBIE (John) & WALKER (J. Henry). A Critical Study of Clinical Laboratory Techniques for the Diagnosis of Protozoan Cysts and Helminth Eggs in Faeces. I. Preliminary Communication.—*Amer J Trop Med* 1938. Mar. Vol. 18. No. 2. pp 169-183. With 1 fig.

With a view to the accurate estimation of the number of protozoan cysts and helminth eggs in any faecal specimen, accurate quantitative determinations were carried out by a number of different methods. These included direct counting in iodine solution of known volumes of a specially prepared homogeneous emulsion of the material; direct counting in haematoxylin-stained fixed films of known volumes of the emulsion; counting in the deposit after 24 to 48 hours sedimentation; counting of a centrifuged deposit and counting by the direct centrifugal floatation method, using zinc sulphate solution (sp.g. 1.180) as the diluting fluid. The highest readings were obtained by the first and last of these methods, the first being slightly better than the centrifugal floatation method. It is especially noted that the zinc sulphate solution is equally suitable for floating protozoan cysts and helminth eggs and with its use concentrations of as high as a thousand-fold may be obtained. Further work on the subject is in progress and the authors expect to be in a position to recommend a simplified practical method for clinical laboratory diagnosis of parasites in faeces. C VI Weyron.

Hsu (H. F.) & Chow (C. Y.) Studies on Human Intestinal Helminths in 809 Autopsy Cases.—Reprinted from *Bull Fan Mem Inst Biol., Zool. Ser.* 1938. Aug. 20. Vol. 8. No. 3. pp. 245-273. [10 refs.]

These autopsies were made in Peiping from 1921 to 1938 and 78.1 per cent. of the persons had lived in North China.

It is pointed out that parasites may be lost before the death of seriously ill persons so the figures of parasitism here given may be lower than they were during life. There were 549 males and 260 females. As regards a number of them faecal examination had been made during life. Our laboratory has been using the direct smear method for the routine stool examination for helminth ova. Usually two samples of stools of different days are required for examination and two smears are made from each sample. Where and when indicated examinations are repeated and the floatation or other methods are also resorted to. [The particular cases unplied have not been traced.]

Ascaris was present in 312 (38 per cent) of autopsies during life. Stool examinations had been made in 149 of them and in 44 no ova had been found so that the examination detected only 70.4 per cent of infected persons. In 3 the worms were immature in 30 there were only male worms in 11 one or more mature females were present as many as 10 males and 6 females in one instance the total ascaris bag was 1,260 the highest number 36 and a footnote adds that the local record is now 63. Enterobius was found in 109 (13.5 per cent) with a total collection of 1,560 and a maximum of 575 in one patient. The percentage of infection in both sexes being the same 13.4 per cent. Trichuris was found in 64 (7.9 per cent) the total collection was 161 from a girl of eleven being the maximum unisexual infection was present in 71.9 per cent. of persons (33.3 per cent. with female worms and 38.6 per cent. with males). *Ancylostoma duodenale* was present in 117 (14.4 per cent) 1,354 worms in all with a maximum of 522 (270 males and 252 females) in a man of 18 a soldier and not a local man (the local record was 77) of these persons 69 had stool examinations during life and in 44 of them no eggs were found in 12 of the 25 negatives only male worms were found in the others males and 1 to 7 females where recorded the sexes of the worms were—males 632 females 690. *Necator americanus* was found in 22 (2.8 per cent) with a total of 164 worms and a maximum of 31 in a man who lived north of Peiping and had never been elsewhere. Stool examination disclosed only 44.4 per cent of the infections of the 22 cases missed, 8 were unisexual parasitisms 4 with males and 4 with females. The total collection was 164 worms 79 males and 85 females. Taking the hookworm cases together there were 127 on 72 of them stool examinations had been made and no ova were found in 45 so only 37.5 per cent of them were detected in the laboratory during life. One visitor to the district had 8 *Fasciolopsis buski* not discovered in the laboratory 4 had *Taenia saginata* one being diagnosed in the laboratory one had *T. solium* but his stool had not been examined during life. Clayton Lane

MARSEILLE (A.) Over het voorkomen van dierlijke darmparasieten bij de bevolking van een stadskampong te Batavia [The Incidence of Intestinal Parasites in a Native Quarter of Batavia.]—*Genoosk Tijdschr. v. Nederl. Indië* 1938. Sept. 27 Vol. 78 No. 39 pp. 2371-2375 English summary

The presence of intestinal animal parasites in the population of a native quarter in Batavia was investigated [But the total examined was small.] The figures obtained have been compared as far as possible with the results obtained in 1918 under similar conditions by FLU. Conclusions from this comparison should be drawn with some reserve as the research technique differs.

It appears that

1. The density of ancylostoma has lessened.
2. The density of *Entamoeba histolytica* need not be decreased.
3. The density of ascaris and trichocephalus remains unchanged.

On the strength of the fact that the density of ascaris and trichocephalus did not undergo any change it has been concluded that the direct as well as the indirect "faecal contact" has remained the same in the native homes in Batavia during the last twenty years, but that a change for the better can be observed as regards the special conditions necessary to cause ancylostoma infection.

SCHAPIRO (Mark M.) CROSBY (Benjamin L.) & SICKLER (Margaret M.)
The Correlation of Clinical Diagnosis and Post mortem Findings in Trichinosis.—*Jl Lab & Clin Med* 1938 Apr Vol 23 No 7 pp 681-687

"In a study apparently the first of its kind, on the diagnostic value of the Bachman intracutaneous skin test for trichinosis as checked against the postmortem examination of 30 per cent. of the patients skin tested, the results show a close correlation between skin test findings and post mortem findings. The skin test may be somewhat more valuable as a negative diagnostic measure than as a purely positive measure.

In a series of 400 persons in whom a routine use of Bachman's intracutaneous skin test was made at the Gallinger Municipal Hospital, Washington, the percentage positive for trichinosis was 18.25. Of the 400 persons 116 came to necropsy, namely 27 positives (22.4 per cent.) and 89 negatives. Of the 27 positives, the larvae of 12 were shown by the microscope only, of 5 by the Baermann apparatus only while 7 were positive and 3 were negative to both. Of the 89 negatives, 1 was positive to the microscope only and one both to it and Baermann's test. The three cases positive to the skin test but negative on autopsy may be due to false positives or to infections not detected by and perhaps without presence of larvae in the 1 gramme of muscle used in the Baermann test. The two false negatives are perhaps due to loss of sensitivity in long-standing and slight infections. At all events the skin test is a valuable help in diagnosis. C. L.

BOREKOVICH (John) The Diagnosis of Trichinosis by Immunological Methods.—*Rev Med Trop y Parasit Habana* 1938 May-June Vol 4 No 3 pp 155-157

HORAK (Archibald L.) & WOLF (A. A.) Trichinosis. Report of Trichinae in Vocal Cords of a Patient with Diphtheria.—*Jl Amer Med Assoc* 1938 Aug 20 Vol 111 No. 8 pp 701-702 With 1 fig [12 refs]

ROTH (Hans) On the Localization of Adult Trichinae in the Intestine.—*Jl Parasitology* 1938 June Vol 24 No 3 pp 225-231

The guinea pig was the experimental animal. The site of election was near the junction of large and small intestines including the caecum. With heavy infective doses this habitat became crowded out and worms were found above and below these limits. The adults lived in the small intestine for 30-37 (and in one case to 50) days in the caecum for 42 to 55 production of young beginning on the 6th to

8th day The long lived ones go on growing and may reach a length of 2.2 mm for males and 4.8 mm. for females while in heavy infections they may when sexually mature be dwarfed 0.6 mm. for males and 1.1 mm. for females
C L

JENSEN (Vilhelm) & ROTH (Hans) Zur Einwanderung der Trichinenlarve in die quergestreifte Muskelfaser [On the Entry of Trichinella Larvae into Striped Muscle Fibres.]—*Acta Path et Microb Scandinavica* 1938 Supp 37 pp 259-271 With 6 figs. [18 refs.]

Trichinella larvae actively bore into striped muscle fibres and complete their further development in them. These conclusions follow from examinations of six guinea-pigs infected by mouth with 1,500 to 6,250 measles and killed from 9 to 17 days later
C L

ROTH (Hans) Experimental Studies on the Course of Trichina Infection in Guinea Pigs. I. The Minimum Dose of Trichina Larvae required to produce Infestation of the Muscles with an Account of the Potential Productiveness of the Female Trichina.—*Amer J Hyg* 1933 July Vol 28 No 1 pp 85-103 [21 refs.]

Male guinea-pigs of about the same weight were fed with trichinella larvae freed by artificial digestion in definite numbers and either with or without knowledge of the sex of each larva. Seven test muscles were then digested namely the masseters diaphragm upper portions of front legs and shanks of hind legs it having been found that in them is represented about 20 per cent of the infection. The number of larvae becoming encapsuled varied from 300 to 2,400 for each female larva swallowed with an average of 1,288 but the commonest numbers lay between 1,500 and 2,000
C L

BACHMAN (George W) Factors Involved in Resistance to Worm Infections with Special Reference to Trichinosis.—*Rev Med Trop y Parasit Habana*. 1938 May-June Vol 4 No 3 pp 121-125 With 2 plates [Spanish version pp 127-131]

We may therefore conclude that in some worm infections there is a localized immunity produced by the accumulation of antibodies and cells of the reticulo-endothelial system of the host, which wards off the invasion of the worm and the resorption of its toxic products.

The effects of age and diet as reported by other investigators are considered in relation to natural immunity particularly as to the action of polymorphonuclear leucocytes macrophages granulocytes and fibroblasts. In acquired immunity in animals these same cells are more active and are in greater numbers. In pigs eosinophilia from repeated sublethal doses of trichinous meat has been marked after the first feeds (32 per cent.) accompanied by a high precipitin titre (1-6 000) after the others eosinophilia has rapidly lessened and precipitin has been absent. It is suggested that the absence of eosinophils may be due to their accumulation in the intestinal mucosa so that there is there a bar to penetration by the larvae.

CULBERTSON (James T.) & KAPLAN (Samuel S.) A Study upon Passive Immunity in Experimental Trichiniasis.—*Parasitology* 1938. June. Vol. 30 No 2. pp 156-166 [12 refs.]

Protection against infection with *Trichinella spiralis* is conferred upon mice by the passive transfer to them of a specific immune serum from rabbits. A smaller percentage of mice treated with the immune serum die, and fewer larvae invade the muscles of the treated mice than among control animals. The action of the antibody of the immune serum appears to be directed specifically against the ingested larvae which are maturing to adult worms in the intestine of the infected animals. The results obtained thus far indicate that an immune serum would have little therapeutic value in the later stages of the disease.

C. L.

IYENGAR (M. O. T.) Studies on the Epidemiology of Filariasis in Travancore.—*Indian Med. Res. Memoirs Supplementary Series to Indian J. Med. Res.* 1938. July. Memoir No 30. pp iv+179. With 24 figs. (4 maps) & 12 plates. [56 refs.]

So far as they are held to be of interest to workers on filariasis, the results of Iyengar's work on the Bancroftian and Malayan infections [done from 1931 to 1934 in the State of Travancore, South India, and already reported to that State's Government] are here published.

Using about 12 cmm. of blood taken between 9 p.m. and midnight without conscious selection from 78,763 persons, microfilariæ were found in 10,031, namely *Mf. malayi* alone in 6,138, *Mf. bancrofti* alone in 3,829 and both parasites in 64. *Mf. malayi* has by far the wider prevalence; it is a rural infection mostly of sandy coastal areas, but found also in forest settlements or in areas close to forest and indeed it is suggested that originally it must have been a forest infection. Its present wide prevalence in Northern Travancore results from local conditions which suit the breathing and feeding of the immature stages of its insect hosts of the genus *Mansonioides*. These are so well figured in the monograph that the illustrations alone essentially tell the story with the floating waterplant *Pistia stratioides* as the knave.

There is shown female *Mf. annulifera* ovipositing on the underwater surface of a floating *Pistia* leaf and the egg clusters so formed; and there is the report that in nature it is only on these leaves that she will lay her eggs: there is the surface of a pond in which *Mansonioides* breeds so covered with floating vegetation, including *Pistia* that larvae and pupæ would have great difficulty in reaching open water to pass the tips of their breathing siphons or trumpets into open air; there are transverse sections of *Pistia* roots showing that they contain large air cavities; photographs of the strong barbed or hooked breathing siphon and trumpet of larva and pupa of *Mf. annulifera*; sections of *Pistia* roots pierced by these structures; and photographs of the roots under water with larvae and pupæ attached to them in this way. In natural conditions the removal of *Pistia* meant disappearance of larvae within 48 hours and in 1,046 ponds which had no *Pistia* in them there were no *Mansonioides* larvae.

The conditions most favourable for the feeding of larval *Mansonioides* are man-made: the steeping of coconut husks in water (an essential preliminary to coir making) which diffuses organic matter on which the larvae feed; and such steeping, *Mansonioides* breeding, and Malayan filariasis correspond in distribution.

The young stages of *Mansonoides* may then be attacked through their food or their air. The conditions which give them such satisfying food are part of the staple industry of that area if it were topped it would be an economic catastrophe. *Pistia* thrives best in stagnant fresh water with a low pH not subject to flooding and effective interference to counter these conditions is not promising. But the clearing away of the floating *Pistia* weed from tanks is possible and the strikingly valuable results which have followed this action in the Shertalai taluk of the State have been reported in the later work of Iyengar [this *Bulletin* 1937 Vol. 34 p 884] and of SWEET and PILLAI [this *Bulletin* 1938 Vol. 35 p 766].

In its figures its 62 tables and its 30 appendices the monograph covers its subject so fully that it must be the subject of constant future reference and the absence of indexes to these three constituents will be missed. A glance at the maps will show how *Mf. malayi* has rural and *Mf. bancrofti* an urban distribution but it will be less easy to find the short appendix which shows that when the former infection was in question the male genitalia were affected in 6 of 1760 persons whereas with the latter the numbers were 96 of 1045. Such a difference must imply some significant difference in habitat or host's reaction or both. The next step in research will surely be the discovery and description of the adult parasite and of the reticulo-endothelial changes which it induces. Workers in India in parts of which as is now clear the infection is so rife cannot afford to be anywhere but in the van of those who seek this knowledge.

BYNTON (J. Orde) & HODGKIN (E. P.) *Endemic Filariasis in the Federated Malay States.*—*Bull. Inst. Med. Res. Federated Malay States* 1933. No 1. 67 pp. With 4 figs & 1 coloured plate [Bibliography.] C. L.

In the Federated Malay States infection with *Mf. bancrofti* is sporadic apart from Singapore. The endemic infection is with *Mf. malayi*. The disease is confined to low lying areas beside rivers with naturally raised banks on these the villages are set with ricefield and swamp on the low land behind them. Where a whole population of 1,398 was examined the percentages of elephantiasis and of microfilariae in the blood were for males over 10 years 18.2 and 10.8 for females over 10 years 2.9 and 4.5 for children 0.3 and 3.3. The Malaysians know that those who work or live in the swamps are the most liable to elephantiasis tappers for instance start work in the dark and may be most extensively bitten then by the insect carriers belonging to the genus *Mansonoides*. The differences between *Mf. bancrofti* and *Mf. malayi* are recounted and the former has been found in immigrants who have been in the country up to 15 years and are unlikely to have been infected since they arrived. It is held as demonstrated by many workers that microfilariae have a life of between two and three months and as probable that the mother worm discharges a fresh batch of young about once a month thus maintaining in the blood a supply of embryos in which the proportion of young mature and old is effectively balanced. Such monthly birth though there is no proof of it at present is very probably so it is held the cause of the downward spreading lymphangitis apt to occur monthly and attributable to successive migrations of enormous numbers of the [sheathed] microfilariae through the walls of the lymphatics to the blood stream.

by which the walls become thickened and impassable with the result that the microfilariae die *in situ* and set up an intense local reaction." As to periodicity the ratio between the numbers of embryos in the blood at midday and midnight is said to be put in general by workers as 1 to 1 000 for *Mf bancrofti* and 1 to 20 for *Mf malayi* while in two cases examined by the writers it was as 1 to 5 [In 4 cases quoted by IYENGAR (see above) the ratio varied from 0 to 2.9 per cent of the night figures.] Of 322 cases of elephantiasis the condition was confined to the lower limbs in all but two in them the right hand and scrotum were involved the youngest ages at which it appeared were 6 and 7 Of 3 689 heavy thick films half an inch across 327 contained microfilariae but half of those that were positive showed 5 or fewer embryos so that, as is noted, all positives can hardly have been found. Intradermal tests were made with an antigen obtained by washing *Dirofilaria immitis* in saline drying pulverizing, extracting in normal saline with suitable filtering to ensure sterility Of 64 persons with elephantiasis the test was positive in 35 of 33 showing microfilariae in 16 of 116 from an endemic area in 33 and of 57 from a non-endemic area in 7 Prognosis is excellent the enforced leisure being conducive to ripe old age.

Clinical filariasis at the Pehang river has risen immediately in the year after severe flooding and this is attributed to delay in getting the padi fields under cultivation, but it is not stated whether the *Pistia* plants, on which *Mansonoides* larvae and pupae depend for air remain and live on these fields when the flood goes down. For prevention, the moving of dwellings away from swamps has been effective, the draining of swamps over large areas is often an economic possibility but the destruction or hand removal of *Pistia* round the dwellings of estate labourers at least so successful in Travancore, is not mentioned.

C. L.

GALLIARD (Henn) Evolution complète de *Filaria bancrofti* chez *Aedes* (*Stegomyia*) *aegypti* [Complete Development of *F. bancrofti* in *Aedes aegypti*].—C. R. Soc. Biol. 1938. Vol. 128. No. 23 pp. 1111-1112.

In *Aedes aegypti* the larva of *Wuchereria bancrofti* has reached the infective stage.

The workers in whose hands *Mf bancrofti* has failed to develop at all or to infectivity are enumerated. Galliard reports that on feeding *Aedes aegypti* and *Aedes albopictus* on 8 carriers of *Mf bancrofti* and on two of *Mf malayi* he obtained success on one patient only and when fed on him, one *Aedes aegypti* out of 5 showed larvae in the thorax, head and labium after 9 days at 26°-28°C. The *Aedes aegypti* were all of the same brood.

C. L.

YAO (Y. T.) WU (C. C.) & SUK (C. Jung) The Development of Microfilaria of *Wuchereria bancrofti* in Sandfly *Phlebotomus sergenti* var *mongolensis*. A Preliminary Report.—Chinese Med. J. 1938. Mar. Supp. No. 2. pp. 401-410 With 2 plates.

All of 8 sandflies caught in nature (4 *P. chinensis* 2 *P. sergenti* *mongolensis* and 2 of a new species) had microfilariae stated to be *Mf bancrofti* in their alimentary canal. As to experimental infections,

brought about by feedings on one of two persons the findings were these.

Fifty nine *P. sergenti* var *mongolensis* bred in the laboratory were allowed to feed on two filarial patients of unequal degrees of infection with the following results (1) 17 of them, dissected between 8 hours and 4½ days after the infective meal were found to harbour exsheathed microfilariae both in their abdominal cavities and in their thoracic muscles (2) 7 of them dissected between 8 hours and 10½ days after the infective feeding were found to harbour pre-sausage forms in their thoracic muscles (3) 3 of them, dissected between 3½ and 6½ days were found to harbor sausage forms and (4) 1 of them dissected 9½ days after the infective feeding was found to harbour post sausage form

Sandflies fed on the case having heavy filarial infection were found to die earlier than those fed on case having the lighter infection

The failure of the microfilariae to complete their metamorphosis in the present series of sandflies is thought to be due to the untimely death of the insects and to the unfavourable conditions for the development of the larvae under which the experiment was carried out, rather than to their inability to attain their full development in these insects

C L

O'CONNOR (F W) & KNOTT (James) Chylous Filarial Lymphatic Varix. A Clinical Pathological Report.—*Trans Roy Soc Trop Med & Hyg* 1938, June 25 Vol. 32 No 1 pp 125-128

This report found among Professor O'Connor's papers after his death was brought up to date by Dr KNOTT. It concerns a negro youth of 17 in whose night blood microfilariae were present.

He had a swelling in the left groin which had begun when he was six, and which had become painful five days ago. This was his first inflammatory attack. The swelling measured 5½ by 2½ in. collapsed on pressure disclosing nodes and tubes and filled on coughing or standing. Aspiration showed chylous fluid with some microfilariae. It was removed by Knott at 2.45 p.m. on 28th October 1935. A sharp lymphangitis appeared in May 1937 but he remained free from further attacks up to March 1938 the date of report. Other enlargements of cord epididymis and inguinal nodes persisted, and he still had microfilariae in the blood.

The clinical manifestations of chylous lymphatic varix are shown to be filarial in origin in that they are associated with advanced pathological changes in the neighbourhood of ten adult *W. bancrofti*. In previous reports (O'CONNOR and HULSE 1932 and O'CONNOR and HULSE, 1933) there was evidence that parturition of female *W. bancrofti* is simultaneous and occurs about noon. That development in utero is simultaneous is borne out by the present study but that parturition always occurs about noon is not upheld by the present findings although it seems to have been imminent at the time of operation. In some previous instances microfilariae, living or degenerating have been found in lymphatic glands in the neighbourhood of parent female *W. bancrofti* and where such parasites were present there was marked evidence of glandular disease in the present one although there is extensive evidence of varicosity of the sinuses the gland substance appears to be healthy the very enlargement of the sinuses may therefore facilitate the passage of embryos through otherwise undamaged glands. In filariasis (where there is great variation of pathological signs, not only in different persons but in different parts of limited portions of tissue from the same person) intensive study along the present lines seems indicated by observers in various countries on all kinds of filarial material that may be available

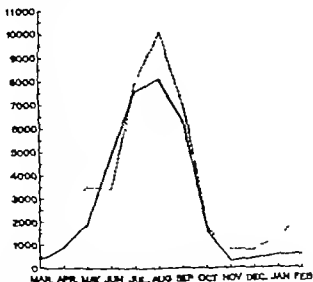
C L

treatment. There appears to have been no bacteriological examination and no search for microfilariae in the blood in any case. In a seventh case an opened hydrocele displayed what was held to be an adult filaria of undetermined species the wound did not heal by first intention and 12 days later the pus contained streptococci and staphylococci and septasine had no effect on the suppuration. [Septasine (benzyl-amino-benzene-sulphamide) is prepared in tablets of 0.5 gm. the dose *per os* being 4 to 8 tablets daily. Soluseptasine (see CHOPRA and DAS GUPTA this *Bulletin* 1938 Vol. 35 p 900) is prepared in 6 per cent solution, the dose being 10 to 20 cc intravenously or intra-muscularly daily.] C L

YEN (Chia-hsien) Studies on *Dirofilaria immitis* Leidy with Special Reference to the Susceptibility of Some Minnesota Species of Mosquitoes to the Infection.—*Jl Parasitology* 1938. June. Vol. 24 No. 3 pp 189-205 [13 refs.]

Mosquitoes were caught wild and fed on an infective dog in Minnesota with the following results —

Many larvae completed their development in *Anopheles maculipennis* and *A. punctipennis* a few did so in *Culex territans* *C. tarsalis* and *C. pipiens*. In other mosquitoes some larvae completed development and some died with pigment encapsulation. In *Aedes vexans* encapsulation may be deferred till the preinfective (second larval) stage, in *A. stimulans* and *A. cinereus* the larvae may get as far as the sausage stage, in *A. canadensis* not beyond that of microfilaria as to others, in *Theobaldia inornata* and *Taeniorhynchus perturbans* larvae reach the malpighian tubules and there die, and in *Aedes triseriatus* they never leave the gut. C L



Total number of microfilariae present in the peripheral blood of 2 dogs over the period of the whole day [See Kuro's abstract, p. 155.]

[Reproduced from the *Chinese Medical Journal* Supplement.]

KUBO (M) The Daily and Seasonal Periodicity of *Microfilaria immitis* in the Peripheral Blood of the Dog.—*Chinese Med J* 1938. Mar Supp No 2. pp 375-384 With 13 figs.

In two dogs examined in Peiping with its great seasonal differences in temperature there was a seasonal as well as a daily microfilarial periodicity

At fortnightly intervals there were made on each dog two-hourly examinations of three specimens each of 20 cmm blood got by a fresh wound in the ear, beginning at 11 a.m. and ending at 9 a.m. next day. The ebb of the microfilarial blood tide was more complete than it often is in *Dirofilaria* infection though this is perhaps more apparent than real the maximum numbers themselves being relatively low. Adding together the total number of microfilariae counted in these twelve two-hourly examinations there was a most marked seasonal difference (r Fig) the daily maximum (in August) being twenty times greater than in the winter (November to March) C L.

ANDERSON (C) & LEHUCHER (P) Note préliminaire sur le premier cas autochtone d'onchocercose cutanée observé en Tunisie [The First Autochthonous Case of Cutaneous Onchocerciasis in Tunisia a Preliminary Note].—*Bull Soc Path Exot* 1938 July 6 Vol 31 No 7 pp 655-658.

SOUTHWELL (T) & KIRSCHNER (A) Some Observations on Guinea-Worm Larvae.—*Ann Trop Med & Parasit* 1938. Aug 2 Vol 32. No 2. pp 193-196. [21 refs.]

The observations were carried out at room temperature 17°C. in February in Liverpool because then only was the material available.

Few cyclops could be got and as one or more were killed daily the stock failed before the larvae became infective this may have been due to *C. vernalis* being a non-optimum host though most of the larvae were found in it. In tap water cyclops died in 6 hours in pond water some died each day and the life span did not exceed 9 days for 4 days they were very active and became progressively less so. The larvae are eaten by cyclops as many as 20 in 15 minutes. If now one draws out the alimentary canal of the host larvae can be seen piercing the stomach wall and the larva's intestine until now clear and empty is seen to contain granular material which becomes denser as life in the host's body cavity goes on. Cyclops have remained alive and active with 10 12 and 15 larvae in them Up to 22 days there was no clear development then the tail became constricted off and began to wither away in the 6th week, the beginning of moult 1 while detachment of the cuticle at the tail end appears to be the signal for the start of moult 2. Here the material gave out C L.

WRIGHT (Harry E) Further Observation on the Incidence of *Hepaticola (Capillaria) hepatica* Ova in Human Feces.—*Amer J Trop Med* 1938. May Vol 18. No 3. pp 329-330

In New San Juan a Panama village, the eggs of *Hepaticola hepatica* were found in 16 of 194 faecal specimens examined. Ten were negative 10 days later an occasional egg was found in another. It is concluded that the eggs were due to contamination as suggested by FAUST and MARTINEZ from examinations on the same villages [see also this *Bulletin* 1931 Vol 28 p 208 209] C L.

DAENGSTANG (S) & TAKSURAT (P) A Contribution to the Knowledge of the Second Intermediate Hosts of *Gnathostoma spinigerum* OWEN, 1838.—*Ann. Trop. Med. & Parasit.* 1938. Aug. 2. Vol. 32. No. 2. pp 137-140. With 1 fig.

"Naturally encysted gnathostome larvae were discovered in 91.67 per cent. of frogs, *Rana rugulosa* Wiegmann in 80 per cent. of eels, *Monopterus albus* (Zuiewa) in 37.5 per cent. of *Ophiocephalus striatus* Bloch and in 30 per cent. of *Clarias batrachus* (Linnaeus)."

[The last two are freshwater fish.] The range of second intermediate hosts includes then frog, fish and eel. C. L.

FRICKERS (J) Het voorkomen van *Dipylidium caninum* (Linné 1758) *Toxocara canis* (Werner 1782) *Ancylostoma caninum* (Ercolani 1859) *Dirofilaria immitis* (Leydi 1856) en *Spirocera sanguinolenta* (Rudolphi 1816) bij den hond (*Canis familiaris*) in Suriname. [The Incidence of *Dipylidium caninum* and Other Helminthic Infestations in Dogs in Surinam.]—*Tijdschr. v. Diergeneesk.* 1938. Sept. 15. Vol. 65. No. 18. pp. 921-924. English summary (4 lines)

The author who is the Government veterinary surgeon of Paramaribo examined the intestines of four hundred dogs which had been destroyed in Surinam. A large proportion of them harboured worms. *Ancylostoma caninum* was the most common and was found in 363 or 90.8 per cent. even in the first months of life. *Spirocera sanguinolenta* came next in frequency 266 or 65 per cent., being infested the degree increasing with age from 22.2 per cent. below four months to 90 per cent. at 8 years and over. *Dirofilaria immitis* was present in 112 (28 per cent.) also increasing with age none was found in those under 4 months old, 2.4 per cent. from 4-6 months and 8 out of ten at 8 years of age. *Dipylidium caninum* was found in 45 only (11.25 per cent.) mostly at 4-5 months when 10 were positive out of 41 at other ages the percentage ranged between 3.7 and 12.6. Lastly *Toxocara canis* was found in 32, or 8 per cent. almost all in young animals, 12 out of 27 under four months but in one only of 68 at 18 months. H. H. S.

SARLES (Merritt P) The in Vitro Action of Immune Rat Serum on the Nematode, *Hippostrongylus muris*—*Jl. Infect. Dis.* 1938. May-June. Vol. 62. No. 3. pp 337-348. With 17 figs.

MISCELLANEOUS

MANSON, BAHR (Philip) The Action of Sulphanilamide on *Brucella abortus* Infections.—*Practitioner* 1938 June Vol. 140 No 6 pp 740-742. With 1 fig

The author describes three cases of abortus undulant fever. In each the serum agglutinated both *Br. abortus* and *Br. melitensis* and in two the intradermal test was positive. Treatment with sulphanilamide was commenced after about six weeks of illness in two and after four months in the third (whose principal sign of disease was acute orchitis). The dose was 1.5 gm. daily by the mouth and this was strikingly successful in reducing the fever and the enlargement of the spleen. A single relapse occurred in each of the first two patients which yielded to further sulphanilamide administered in the second case by deep subcutaneous injections of 5 cc. one each day for 6 days. The effect on the temperature was too striking to be coincidental. The small terminal bout of fever noted on cessation of sulphanilamide treatment need not be regarded as a definite relapse but as the natural termination of the infection. [See also this *Bulletin* 1938 Vol. 35 C IV p 828]

TRAUT (E. F.) & LOGAN (Catharine Elizabeth) Undulant Fever treated with Sulfanilamide.—*Jl Amer Med Assoc* 1938 Sept. 17 Vol. 111 No 12. pp 1092-1093 C IV

Two patients suffering from undulant fever were treated with sulphanilamide in 1937. The first was engaged in work which entailed the handling of both raw pork and beef. On admission to hospital after three weeks of fever his serum agglutinated the bovine and porcine forms of *Br. melitensis* up to 1 in 1,280 dilution. After the failure of stock brucella vaccines to influence the condition sulphanilamide was given for nine days with excellent results the temperature being reduced to normal after the second day. The second patient a woman of 69 had been ill for eight weeks and had become very anaemic finally developing jaundice and a stuporose condition. Her serum agglutinated *Br. melitensis* in 1 in 15,000 dilution. After a blood transfusion 30 grams of sulphanilamide (prontylin) was administered daily (it is not stated for how long) and within 48 hours she was free from fever. The cure in both patients is apparently permanent.

GEAR (James) Onyalai a Form of Purpura occurring in Tropical Africa. Report of Cases occurring in South Africa.—*South African Med Jl* 1938 Sept. 10 Vol. 12. No 17 pp 632-637 With 2 figs. C IV

Onyalai a disease of obscure origin and pathology engendering fear in the African native owing to its sudden onset and high fatality rate has been observed since F. C. WELLMAN first wrote of its occurrence in West Africa in 1904. In the present paper the author records seven cases occurring in South Africa three ended fatally and the post mortem findings are noted. Among the patients was one woman and the ages ranged between 20 and 40 years. The symptoms were

practically the same in all sudden onset with feeling of lassitude, then soreness of the tongue, gums and buccal mucosa with rapid formation of "blood blisters" and profuse hæmorrhage from the mouth, nose, and blood-filled blebs or petechiae on the surface of the body. passage of blood in urine and faeces also occurs. The blood-filled bullae vary in size from that of a pea to $1\frac{1}{2}$ inches in diameter. The eyes and face are suffused and swollen and the parotid glands are enlarged and tender. Treatment by hæmostatics is of little avail, the anaemia is profound and in fatal cases death takes place usually within a week. The best treatment which when it succeeds does so rapidly is intramuscular injection of 20 cc. citrated whole blood.

At autopsy all the organs and tissues show petechiae (in one of the author's cases a large cerebral hæmorrhage was the immediate cause of death) the spleen is a little enlarged and friable. An instructive table giving the results of laboratory investigations in the seven cases shows that in the average case there is but little change from the normal in the number of erythrocytes or leucocytes—in fatal cases, naturally there is a severe drop in the former—and the colour index varied from 0.85 to 0.68 in those who recovered. The bleeding time was prolonged, but coagulation time showed little if any departure from the normal. the chief characteristic was marked reduction to almost complete absence of platelets. In two cases examined megakaryocytes were present in normal numbers in the bone marrow and there would therefore, seem to be an inhibition of the normal maturation of platelets. Intravenous blood-transfusion is less efficient in treatment than smaller amounts intramuscularly which suggests a deficiency of some factor in normal whole blood which stimulates platelet formation and maturation when in contact with the tissues. [This is rather an alternative form of statement of what has been found than an explanation of the pathogeny.] Prior to the onset of illness the patients had generally been in good health and living on a liberal mixed diet. Further investigation of cases and experimental work are called for and will be awaited with interest.

H H S

HELLMAN (J.) Onyiah. [Correspondence.]—*South African Med J* 1938. Oct. 8. Vol. 12. No. 19. p. 742.

Referring to the above article, Dr Hellman tells of five cases of the same, or closely similar condition seen by him among Hottentots in the Kalkfontein area. [In the atlas, two places named Kalkfontein are mentioned, about 150 miles apart, one in Griqualand West, the other in Prieska.] Of these three were women between 55 and 65 years and two were men of 40–45 years. As in Dr Gear's cases the onset was sudden. Thinking the condition was scorbutic, Dr Hellman prescribed orange juice and an antiscorbutic diet, but unavailingly. autohæmotherapy—20 cc. injected intramuscularly—was followed by rapid recovery and two of the patients received only one injection. In three it had to be repeated, but only once it would appear from the report. So far none has had any return of the symptoms, though the first occurred more than three years before. [This communication deals purely with the clinical aspect, no laboratory examinations were carried out, so the author does not venture to offer any suggestions as to the pathogeny of the condition.]

H H S

SNELLING (John G.) *Thrombocytopenic Purpura. Three Case Reports.*
—*New Orleans Med & Surg J* 1938. Nov. Vol. 91 No 5
pp 231-235 [23 refs]

This article is of particular interest in that though no mention is made of the fact nor even any reference to the condition the disease described bears many very remarkable points of similarity to *onyxiasis*. Apart from the profuse haemorrhages in skin, and from mucous surfaces—mouth nose rectum etc.—the blood conditions show many points in common. Thus the cardinal hematologic findings in thrombocytopenic purpura are (1) Marked decrease in platelets (2) normal coagulation time (3) prolonged bleeding time (4) delayed contractility or non-retractile clot (5) positive constrictor test

Referring to Dr GEAR's article abstracted above we see that the first three of these are common to *onyxiasis* and to thrombocytopenic purpura the fourth and fifth are not mentioned. Other features common to both are the sudden onset and the splenic condition. On the other hand, of three cases detailed in Dr Snelling's paper two were children, 5 and 7 years of age the other was aged 20 years and all were females whereas in the few recorded cases of *onyxiasis* males predominated and the ages of the patients were usually between 20 and 40 years

The author reviews the literature of idiopathic purpura and discusses the use of snake venom in treatment and where that and transfusion of blood fail he has found splenectomy very successful. *Onyxiasis* runs, when fatal, too acute a course for trial of tentative remedies and as seen in Gear's article autohaemotherapy with comparatively small amounts (20 cc.) proved very effectual whereas transfusion of larger amounts did not [Further study of these two—if they are two—conditions might reveal findings of great importance and it would be of much interest to observe the effects of small injections of the patient's whole blood intramuscularly in cases of thrombocytopenic purpura. Cases of *onyxiasis* showed no relapse though one was kept under observation for three years (see HELMAN above)] H H S

DUTTON (L. O.) *Thrombopenic Purpura due to Food Allergy.*—*J. Amer. Med. Assoc.* 1938. Nov. 19 Vol. 111 No 21
pp 1920-1921

A further case of thrombocytopenia associated with symptoms resembling those of *onyxiasis* but not so severe as those seen in the latter is reported here for two reasons (1) In order that a dietetic origin may be looked for in *onyxiasis* cases (2) That a simpler treatment than splenectomy may be tried in thrombocytopenic purpura. If the results are beneficial, much good will have been done if the attempt is ineffectual no harm will have resulted and the distinction of the two diseases from one another may be established.

SQUIRE and MADISON nearly two years ago (January 1937) reported three cases of thrombocytopenic purpura associated with probably due to food allergy. The case recorded by the author is that of a white woman of 59 years who had suffered on and off for years from purpuric symptoms—ecchymoses petechial haemorrhages, epistaxis haematuria—with marked reduction of platelets down to 60 000 per *cmm*. The allergy appeared to be due to citrus fruits and when these were excluded no fresh spots were seen and the old ones cleared

completely in ten days and the platelet count rose to 240 000. When small amounts of citrus fruits were cautiously added to the diet fresh ecchymoses appeared in three days.

The author comments that at least an unknown percentage of persons suffering from this disease [thrombocytopenic purpura] might be relieved by a much simpler procedure than radical splenectomy and it is amazing that a shock organ could be so narrowly limited that only the cells responsible for the platelet formation in the bone marrow could be affected by an allergen.

H H S

MEDICAL AND SANITARY REPORTS

Kedah (1937)

Kedah a Malay State under British protection, lies on the west coast of the Malay Peninsula. It is bordered on the interior by Selang and Perak, and includes the island of Langkawi and a number of smaller islands to the south. The mainland is about 105 miles long and about 65 miles wide at its widest part. Its area, including the Langkawi group of islands, is about 3 649 sq miles

Vital Statistics.—The data relating to population births deaths etc., continue to be presented in great detail in a number of tabular statements (see comments below) As mentioned in the 1938 *Supplement* to this *Bulletin* deaths in early life appear to be a feature of Kedah mortality experience during the year under review approximately 50 per cent of the total deaths registered occurred at ages 0-20 years and no less than 45 per cent. in the 0-5 age-group alone. The principal facts for the State as a whole read as follows —

Race	Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
Malays	319,260	11,654	36.5	6,265	19.6	1,490	127
Chinese	83,472	3,743	43.8	1,914	22.4	503	133
Indians	56,402	2,007	35.6	1,407	24.9	432	215
Non Asiatics	631	7	11.1	1	1.6	—	—
Others	13,010	243	11.4	194	14.9	21	85
Totals	474,775	17,664	37.2	9,781	20.6	2,438	138

As regards *Estate Populations* the relevant data are set out in similar fashion for purposes of comparison, viz. —

(a) European Holdings

Race	Estate Population	Births	Birth Rate	Deaths	Death Rate	I.M.R.
Malays	5,756	69	12.0	21	3.6	203
Chinese	1,805	31	17.3	13	7.2	129
Indians	38,112	1,339	33.5	903	25.0	281
Javanese	61	—	—	—	—	—
Others	103	1	9.3	1	9.2	—
Totals	43,842	1,490	33.9	938	18.8	255

(b) Asiatic Holdings

Race	Estate Population	Births	Birth Rate	Deaths	Death Rate	I.M.R.
Malays	7,559	25	3.3	17	2.3	160
Chinese	3,091	15	4.9	9	2.9	6.7
Indians	2,287	23	12.2	29	11.4	107
Javanese	44	—	—	—	—	—
Others	80	—	—	—	—	—
Totals	13,061	63	5.2	62	3.88	273.8 (? see below)

With regard to the above data relating to population on Estates it should be added that though numerous tabulations of facts are supplied, some of the calculated rates appear to be incorrect and in other cases discrepancies are noted between different statements relating to similar facts. For example, in Table XXI.B the crude birth rate on Asiatic Holdings is given as 20.4 per 1,000 but the 68 births related to a population of 13 061 give a birth rate of 5.2 per 1 000. In Table XV.D dealing with Asiatic mortality data, the crude death rate is published at 16.5 per 1 000 but 52 deaths related to a population of 13 061 give a death rate of 3.9 per 1 000. Table XV.A gives the deaths on Asiatic Holdings as 23, but Table XVI records them as numbering 52. The infant mortality rates on Asiatic Estates do not appear to be convincing—three specific rates are quoted in Table XXI.B as 160, 107 and 6.7 respectively yet the gross rate for all nationalities is given as 273.8 per 1,000 births. As a matter of fact on the basis of data supplied in Table XV.A the specific rates for Malaya, Indians and Chinese are 200, 214 and 67 respectively and the rate for all communities 178 per 1 000 births. The Report observes "Figures for Asiatic Estates are known to be inaccurate." This remark is presumed to relate to the raw data supplied from these sources and not to the arithmetic applied to the facts for the calculation of rates.

The usual statement dealing with the health of *European Officials* seems to have been omitted from the Report under review.

Maternity and Child Welfare Work.—It is stated that though it is yet too early to seek the benefits resulting from the introduction of the *Kampong Midwifery Service* (see this *Bulletin* 1938 Supp. p. 189*) yet a most successful beginning has been made. The four locally trained midwives posted to kampongs will have an uphill fight before they completely overcome the conservatism of Malay women and succeed in combating the opposition of the old *bidans* but strenuous efforts are being made to surmount these and other difficulties. Four more midwives are to be posted to kampongs and four new pupils are to commence their training. In addition to the introduction of this service, with a view to the improvement of Midwifery practice the new *Midwives Enactment* aims at the control of midwifery by the establishment of a system of compulsory registration and organized supervision—so far the new law applies only to the three largest towns, viz. Alor Star, Sungai Patani, and Kulim.

The work of the Lady Medical Officer in charge of Maternity and Child Welfare has again proved of immense value—the record of the year's work reads as follows—

Item	Women's and Children's Clinics		
	General Hospital	Town Dispensary	Other Dispensaries
First Visits	891	2,102	—
Subsequent Visits	761	3,209	—
Injections (for Yaws)	2,107	—	294

School Hygiene—The provisional approval of Government has been obtained sanctioning the appointment of an additional Assistant Health Officer primarily intended for general health work in North

Kedah but concentrating his activities upon laying the foundations of a regular School Medical Inspection Service. During the year under review all Malay Vernacular Schools not visited in the preceding year were inspected. In the course of these visits opportunities were used for giving brief talks on health matters to school-children. Various recommendations were made with a view to improving the sanitary conveniences of school premises and for remedying minor defects. Three Chinese schools were visited and inspected at the request of the Registrar of Schools. Chinese schools are not subject to the routine visits paid by the Medical Department. Upwards of 5 000 school-children were examined in nine districts and 206 of them were found to have enlarged spleens. Spleen rates ranged from *nil* to 13.3.

As regards the volume of work dealt with in connexion with the School Medical Service it is noted that 39 Malay Vernacular Schools and 4 690 school-children were inspected. 3 non-Government Chinese Schools and 189 children were inspected. The principal defects recorded during the medical examination of school-children may be summarized as follows —

Defects	Percentage of defects recorded in —	
	Malay Vernacular Schools	Non-Government Chinese Schools
	Per cent.	Per cent.
Caries Class I	9.5	10.6
" " II	8.7	7.1
" " III	7.3	15.3
Scabies	5.0	4.7
Eye diseases	0.3	3.5
Enlarged spleen	4.1	1.2
Anaemia	1.0	2.4
Yaws	1.7	<i>nil</i>
Not vaccinated	2.1	5.0

Public Health Sanitation etc. — The various increases in Departmental staff necessitated by the reorganization of Medical Services (see this *Bulletin* 1938 Supp p. 190*) received the approval of Government. New services provided or contemplated are mentioned in appropriate sections of the present Summary. Malaria control work in the three principal towns continued along lines previously described. In rural areas where anti-larval measures are impracticable drug prophylaxis was continued.

In the nine Sanitary Board areas (see this *Bulletin* 1938 Supp p. 190*) little has been done to improve methods of *sewage disposal*. Considerable attention was devoted to the improvement of *water supplies* during the year. Schemes envisage the provision of filtered and chlorinated supplies to all the large towns and extension of supplies to rural dwellers. These schemes can only be developed with the gradualness of time. As regards *housing and town planning* it is stated that in the larger towns considerable demolition of old and insanitary houses was carried out during the year and that building layouts have been prepared for use in both large and small towns. Certain areas have been gazetted so that future building can be controlled.

Health conditions on estates mines etc. continued to receive attention and the Health Board Scheme applicable to such properties

functioned smoothly. All European Estates were visited at least once during the year but it is again noted that a large amount of extra work was entailed in the supervision of Asiatic Estates owing to the obstruction of the majority of owners. Improvement in housing conditions, sewage disposal, water supplies etc. on various estates is recorded.

Quarantine restrictions were applied against the arrival of passengers and various commodities from Siam on account of cholera. Railway passengers subjected to routine inspection at Padang Besar numbered 12,758.

Hospitals, Dispensaries etc.—A considerable amount of building and general activity featured the year under review. The new schemes of work envisage the provision of a Dental Clinic and Tuberculous Department at the General Hospital, Alor Star; provision of a Venereal Diseases Clinic as a branch of the Town Dispensary, Alor Star; new dispensaries in three areas; structural additions to various hospitals etc.

Further extension of the chain of *kampong* dispensaries will ensure that the whole of the rice-growing population in North Kedah will shortly be provided for. Similar provision for the remoter areas of Central and South Kedah are also under consideration.

The training of dressers has now been brought into line with the schemes of work followed in the Straits Settlements and Federated Malay States. One dresser is to attend the Pharmacy course at the Singapore College of Medicine and one Health Inspector is attending the course of study leading up to the Diploma of the Royal Sanitary Institute.

As regards the volume of work dealt with at medical institutions providing for the needs of the general public and Government Officials, the following details have been extracted —

Hospital	In-patients			Out-patients		
	Beds	Treated	Dead	New Cases	Re-vents	Totals
Alor Star	300	6,852	325	10,206	2,856	13,064
Sungei Patani	300	6,729	293	7,048	1,485	8,533
Baling	33	347	13	3,548	1,042	4,590
Kulim	210	4,878	230	9,299	2,444	11,843
Langkawi	70	498	23	3,230	801	3,731
Prison Sick Wards						
Alor Star	'	129	—	1,291	4,991	6,282
Sungei Patani		—	—	120	696	816
Totals	913	19,531	889	34,844	14,017	48,861

The Dispensary Records read —

8 Outdoor Dispensaries, Alor Star	31,301	14,819	46,120
1 " Dispensary Suk (Central Kedah)	3,447	364	3,811
1 " " Bandar Bahru (S. Kedah)	2,173	364	2,536
1 " " Padang Matrat (Langkawi)	770	46	816
4 Motor Travelling Dispensaries (1 each District)	20,793	2,738	23,531

The above details refer to State Hospitals. The medical requirements of the large labour forces on rubber *estates* are met by the Health Board organization hospitals maintained by the Health Board groups accommodate a total of 1063 beds. Each hospital has an outdoor dispensary. To Group Hospitals on European Estates 22 679 patients were admitted and 717 died the corresponding figure for hospitals on Asiatic Estates being 935 and 20 respectively. The notes which follow summarize the principal references to morbidity experience during 1937 taken from the Report under review.

No case of *cholera* or *plague* was reported. The cholera epidemic in Siam gave rise to considerable anxiety and special precautionary measures were taken (see *Quarantine* above). No anti plague measures have ever been enforced though rats are found in abundance in all centres of population.

Fifteen cases of *smallpox* were reported from South Kedah four of them terminating fatally. The first case (a Chinese woman newly arrived from China) all other cases occurred among Malays on a rubber estate) occurred on June 28th and the last on July 24th. A special vaccination campaign was instituted and 27 400 estate employees were vaccinated total vaccinations in the State numbered 41,333.

A prolonged epidemic of *measles* occurred chiefly on estates and among Indian labourers the infection was introduced by newly arrived Indian labourers. Notified cases numbered 1 443 and 26 deaths were ascribed to this cause. It is said that a considerably larger number of deaths occurred certified as due to broncho-pneumonia which should have been assigned to measles. One fatal case (an Indian) of *tropical typhus* was recorded.

No epidemic of *malaria* was recorded cases dealt with show an increase over the 1936 figures but fewer deaths were assigned to the disease the recorded facts being 7 007 cases and 580 deaths. On the other hand deaths ascribed to *fevers unspecified* numbered 3 494 so that this title becomes responsible for 36 per cent. of the total deaths in the State due to all causes. As regards malaria on estates 13 184 cases of malaria and unspecified fever and 67 deaths were recorded. The majority—12 545—of the cases occurred on European estates but while on European holdings deaths due to malaria constituted 6 per cent. of the total deaths due to all causes on Asiatic estates the corresponding ratio stood at 25 per cent. With regard to the data relating to Asiatic holdings the Report adds. It is impossible to consider these figures as of any value whatever for statistical purposes.

Of *enteric fever* 69 cases and 10 deaths were notified, and of *dysentery* and *diarrhoea* 520 cases with 370 deaths. It is also stated that in State hospitals 244 patients were treated for dysentery and 16 died and in Group Hospitals (estates populations) 312 patients were admitted and 33 died [*i.e.* a total of 556 in-patients alone treated for dysentery].

Mention has been made of the proposed establishment of a *Tuberculosis Department* at the General Hospital, Alor Star (see *Hospitals* above) and with this aim in view Dr P. T. K. NAYAR, one of the Assistant Medical Officers attended an intensive course of study of modern methods of treatment of tuberculosis at the Brompton Hospital, London. The scheme aims at the provision of a fully equipped and special ward and the establishment of an out patient clinic a modest beginning has already been made to provide these

special T.B. services. In patients at State Hospitals treated for *pulmonary tuberculosis* numbered 442 and 196 died for *other respiratory diseases* 694 cases and 71 deaths were recorded. To the Group Hospitals (estate populations) 473 patients were admitted suffering from *pneumonia* and 146 deaths were ascribed to this cause.

Other diseases—During the year in the State as a whole 301 deaths were registered as due to *ankylostomiasis* 647 cases were treated in State Hospitals with 13 deaths and 226 in Group Hospitals with 2 deaths. *Barbers* caused the deaths of 144 persons, 99 of these being Malays, 31 Chinese and 11 Indians no mention of the special investigation of lines of treatment is made (see this *Bulletin* 1938 Supp. p 193*) Kedah *lepers* continue to be accommodated and treated at the four institutions outside the State during the year 213 were under treatment 14 died and 16 absconded. In a special Appendix the new policy regarding the control of leprosy is discussed (see below *Scientific*) Deaths ascribed to *syphilis* numbered 29. A special *Veneral Diseases Clinic* is to be established in a room which is to be set aside for this purpose in the new Town Dispensary Alor Star. The new *Dental Clinic* (see this *Bulletin* 1938 Supp. p 190*) has functioned with success since its opening in October 1937 during the last three months of the year 215 new cases and 250 re-visits were recorded.

Scientific.—Each of the five State Hospitals has its own branch laboratory and during the year 43 728 specimens were examined. At the Central Laboratory Sengul Patani, 7 413 specimens were examined but findings are not recorded.

Three special Reports appear as Appendices to the Report under review viz

1 *A Health Survey of Langkawi Island* by Dr E. D. B. Wolff, who records the results of his examination of 2,800 persons, the sanitary condition of the island etc.

2 *The New Policy regarding the Control of Leprosy* which aims at abolition of the former system of compulsory isolation by means which will induce sufferers to seek treatment voluntarily etc.

3 *Report of a case of Hydrophobia* by Dr R. SIVARAMANDAM.

Financial—Total expenditure on Medical Department services during 1937 amounted to \$551,225

P. Granville Edg

Perlis (1937)

Perlis is the most northerly of the Malay States, lying on the west coast of the Malay Peninsula. It is bordered on the interior by Siam to the north and Kedah to the south, and has an area of about 316 sq. miles.

Vital Statistics—It is stated that the registration of births and deaths will eventually be carried out by an Assistant Medical Officer trained by the Senior Health Officer Kedah. The relevant vital statistics for 1937 are shown in the accompanying Table.

[The Table on page 49 entitled *Stillbirths according to Nationality and Sex* actually presents live births with these distinctions 105 stillbirths were recorded.]

There were 3 resident *European Officials*. *Asian Officials* resident numbered 360 with the same average number resident seven were invalided and two died.

Nationality	Population	Births	Birth rate	Deaths	Death rate	Infant Deaths	I.M.R.
Europeans	7	—	—	—	—	—	—
Eurasians	6	—	—	—	—	—	—
Chinese	6,224	257	41.3	173	27.8	37	144
Malays	43,497	1,474	33.9	725	16.7	142	96
Indians	977	23	23.5	23	23.5	3	130
Others (mostly Siamese)	1,992	39	19.6	44	22.1	7	179
Totals	52,703	1,783	34.0	965	18.3	189	105.4

The population of labourers and their dependents on *estates* totalled 436 distributed as to 361 Indians 74 Malays and a single Chinese. Fifteen births and six deaths—all Indians—were recorded.

Maternity and Child Welfare Work—One of the midwives trained at Alor Star for the newly created *Kampong* Midwifery Service (see p 162 *supra* and this *Bulletin* 1938 Supp p 194*) was duly posted to her *Lampong* in Perlis and another pupil midwife has commenced her course of training. During the year 13 deaths were registered as due to diseases of pregnancy childbirth and the puerperal state. The Hospital midwife attended 4 labour cases in the homes of patients. Vernacular Schools were medically examined by the Lady Medical Officer Kedah. Owing to the absence of leave during part of the year of the Assistant Medical Officer and of the Assistant Health Officer when attending a course of training in Kedah the volume of work accomplished was somewhat less than usual. Ten schools were inspected and 948 children medically examined. The principal findings being summarized as follows—*dental caries* 30.6 per cent. *enlarged spleens* 17.5 per cent. *anaemia* 17.2 per cent. Only 0.1 per cent. were affected with *yaws*. 37 children received N.A.B. injections for the disease.

Public Health Sanitation etc—The work of the Medical Department Perlis is supervised by the State Surgeon Kedah (Dr J. PORTELLY) who reports that the general health of the Perlis population during 1937 was good. Routine anti-malarial measures continued to be carried out and it is hoped by better control and by anti-larval and drug prophylaxis to reduce malaria incidence in the endemic areas in course of time. Methods of *sewage and refuse disposal* remain as previously described (see this *Bulletin* 1938 Supp p 194*). As regards *water supplies* these remain as described in the previous issue of the *Supplement* to this *Bulletin*. reference is again made to the proposed installation of a filter plant at Padang Besar (see this *Bulletin* 1938 Supp p 194*). Kaki Bukit still obtains its supply from sources liable to pollution. The provision of *safe supplies* can only be met by the removal of the illages to a new site and this matter is receiving the attention of the authorities. Additions and improvements to market stalls are reported shops street stalls and hawkers are inspected at regular intervals and licences issued only when prescribed sanitary standards are maintained. Steps are being taken to deal with unsatisfactory itinerant hawkers. *Hospitals Dispensaries etc*—New Buildings for the accommodation of certain members of Medical Department staff were completed and occupied and various additions made to existing

buildings during the year. The medical institutions provided for in-patient and out-patient treatments remain as previously described (see this *Bulletin* 1938 Supp. p. 194*). At the General Hospital Kangar 1,707 in-patients were dealt with and 89 deaths were recorded, 36 of these deaths occurring within 48 hours of admission. 806 of the patients were Chinese, 594 Indians and 268 Malays. Out-patients treated at this Hospital numbered 5,443 and of these 3,288 were Malays, 1,211 Indians and 687 were Chinese. [The racial proportions among in-patients and out-patients are striking. Among in-patients Chinese head the list with 47 per cent. while only 17 per cent. were Malays, but among out-patients the positions become reversed, Malays 60 per cent. Chinese 16 per cent.] The Outdoor Dispensary at Kaki Bukit dealt with 6,315 new cases and the Travelling Dispensary 411 cases (exclusive of those treated at Schools, Coolie Lines, etc.).

In common with usual experience *malaria* and *fevers unspecified* were responsible for the largest proportions of the total deaths registered in Perlis during 1937—no less than 41 per cent. of the deaths due to all causes appear under these two titles. Only 19 deaths were specifically assigned to *malaria* but 376 were due to *unspecified fevers*. Hospital in-patients treated for *malaria* numbered 457 and 10 died. Types of infection are not differentiated in the Hospital Returns, but among 4,872 blood-films examined at the Hospital Laboratory Kangar 1,912 contained *malaria* parasites the percentages and types being *benign tertian* 51.4 *subtertian* 38.5 *mixed infections* 9.8 and *quartan* 0.3 per cent. Larval surveys indicated *A. barboides* as the most prevalent type, followed in descending order by *A. hyrcanus* and *A. maculatus*.

Twelve cases of *cerebrospinal fever* (all Chinese and mostly mining coolies) were notified. Eleven of the cases occurred in Kaki Bukit and its suburbs, an insubstantial area where conditions are ideal for the spread of such a disease. Ten of the cases were treated in Hospital with 5 deaths. Prompt and energetic action succeeded in suppressing the outbreak. No case of *typhus* or *smallpox* was reported. 1,796 vaccinations were performed.

Rabies.—Seven persons were bitten by dogs actually rabid or suspected of being rabid: two were treated at Alor Star and three at Kangar Hospital. One refused treatment and died a month later and another reported at the Hospital a month after the bite and developed hydrophobia the day after admission and died. (This case is referred to in the Kedah Report above.) The brains of two dogs sent to the Institute for Medical Research, Kuala Lumpur were declared positive for *rabies*.

Ten deaths were ascribed to *enteric fever* in the State as a whole. Four cases of *typhoid fever* with one death and one fatal case of *paratyphoid* were treated in Hospital. Hospital patients treated for *dysentery* numbered 29 and 3 deaths were recorded. 14 of the patients were suffering from the amoebic type of the disease.

Forty-seven deaths were registered as due to *pulmonary tuberculosis*. Cases admitted to Hospital numbered 54 and of these 51 were pulmonary. 11 hospital deaths were recorded. Deaths due to *pneumonia* (all forms) in Perlis totalled 23. 44 cases with 15 deaths appear in the Hospital Returns.

Of the 4 Perlis *lepers* one was accommodated at the Pulau Jerejak Leper Settlement, Straits Settlements and three at Sungai Baloh, F.M.S.

Other diseases mentioned in the Hospital Returns include 82 cases of *ankylostomiasis* 107 of *influenza* 54 of *ulcers* and 32 of *chickenpox*. In the tabulated causes of death it is noted that 46 deaths are ascribed to *Demam Batok* a term which vaguely connotes *feverish cough*.

Scientific.—Of the 8,205 specimens examined at the Laboratory 4,872 were the blood films already mentioned under *malaria* in the preceding notes. As regards the remainder these included 1,740 faecal specimens 1,252 giving positive findings and 283 specimens of sputum of which 32 contained *Mycobacterium tuberculosis*.

Financial.—Expenditure on Medical Department services during 1937 amounted to £45,649 a sum which represents 6 per cent. of the total revenue or 7 per cent. of the total expenditure of the State during the year under review.

P. Granville Edge

Kelantan (1937)

The State of Kelantan is on the eastern side of the Malay Peninsula. On the north is the China Sea, on the south Pahang on the east Trengganu and the China Sea on the west Perak and Siamese Territory. The area is estimated at 5,720 sq miles, or rather less than that of Yorkshire.

Vital Statistics.—Births and deaths registration became compulsory only in July 1930. It is said that amongst Malays and other races registration is fairly complete but information is lacking regarding births and deaths occurring among inhabitants of the remote and hilly districts of Ulu Kelantan where many aboriginal tribes are to be found. The relevant facts for the year under review read as follows—

Race	Estimated Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
Europeans	80	2	25.0	3	37.5	1	?
Malays	354,844	9,733	24.6	8,278	17.7	1,099	112.9
Chinese	27,034	698	25.8	396	14.6	64	91.7
Indians	10,401	225	21.6	200	19.2	48	213.3
Eurasians	72	0	—	2	27.8	0	0
Others	7,947	183	19.2	106	13.3	9	58.8
Totals	400,378	10,811	27.0	8,983	17.4	1,221	112.04

Deaths are classified in the Report under review by race age groups and by principal causes.

Of European Officials there were 28 resident with the same average number resident no invalids or deaths were recorded. Of the 1,057 non-European Officials with the same average number resident it is noted that eleven were invalids and five died during the year. The total labour force with their dependents on *Estates* is returned as 6,135 but these are exclusive of *Estates* employing entirely Malay or Chinese labour 3,796 were Indians and their dependents and among this group 111 births and 109 deaths were recorded giving birth and death rates 29.7 and 29.2 respectively. There were 33 infant deaths so the infant mortality rate would be 297.2 per 1,000 registered births.

Maternity and Child Welfare Work.—There is no special Maternity Hospital in the State but maternity beds are available at the Kota Bharu Hospital where however in spite of every effort services are not so far popular among Malay women. During the year 187 deliveries were recorded at the Hospital and of these 122 were Indian women, 59 were Chinese, but only 1 was a Malay. Free facilities are provided for ante-natal treatment and delivery of women from *Estates*. Provision was made for the training of four Malay *midwives* but owing to the illiteracy of Malay women difficulty was experienced in obtaining suitable candidates with the result that only one was selected to commence the course of training (see this *Bulletin* 1938 Supp. p. 197*).

An *Infant Welfare Centre* was started in premises acquired in the market area of Kota Bharu the work being under the charge of a part time Assistant Lady Medical Officer assisted by an Infant Welfare Nurse. This undertaking has made a most successful beginning the clinic is popular and attendances have steadily increased month by month. The Health Nurse, after her daily work at the Clinic visits homes in Kota Bharu and in adjacent kampongs from which births have been reported. The record of the year's work shows that 1,343 visits were paid to newly born infants 1 497 visits were paid to women (858 of these to Malay women) and 1 173 to children (of the latter 703 were Malay children).

School Hygiene.—During the year 1 English and 42 Malay Vernacular Schools were inspected and 2,896 school-children medically examined. In towns the general sanitary condition of the schools is satisfactory and it is also said that in areas where anti malarial measures are efficiently carried out spleen rates are low. Among other findings it is said that minor *skin diseases* are common and the percentage among children examined was 21.8. *dental caries* is equally prevalent with 21.2 per cent. of the pupils examined, *anaemia* was present in 5 per cent. and *diseases of the eye* in 2.6 per cent. while 48 cases of active *yaws* were detected and referred for treatment. A list of pupils and their defects is given to the teachers in towns, necessary treatments are supplied at Hospitals and Dispensaries, and in rural areas by Travelling and Pack Dispensaries during the course of their weekly visits. Hygiene is taught in the schools by teachers.

Public Health Sanitation etc.—The lack of a satisfactory index of the general health of the State is again referred to (see this *Bulletin* 1938 Supp. p. 197*). For purposes of public health administration the State is divided into five Districts which cover the main centres of population. Anti-malarial work was carried out along lines previously described in the notified areas the zone of control in Kuala Krai was considerably extended. Additional work undertaken during the year included control measures in a Chinese rubber estate near Kuala Krai, the canalizing of the Sungai Krai the construction of earth drains and the replacement of roadside ditches by concrete drains. Frequent larval surveys were undertaken and regular mosquito surveys were continued.

The single bucket system of *sewage disposal* continues in use (see this *Bulletin* 1935 Supp. p. 180*). Considerable extension of the service is necessary for many houses in the towns and kampongs lack sanitary latrines and are still dependent upon primitive methods of

disposal of excreta Every effort is being made to bring about improvement where the erection of new houses and repairs to old ones are approved the construction of sanitary latrine accommodation is made compulsory Kota Bharu is still the only town in the State having piped water supplies but even here shallow wells inadequately protected are largely used In all premises licensed for the sale or manufacture of foods and drinks the use of piped supplies has been made compulsory In other towns in the State supplies are obtained from wells streams and rivers having regard to the fact that bowel diseases are almost universal provision of piped supplies is a sanitary necessity Matters concerned with housing and town planning continued to engage the attention of the responsible authorities defects are being remedied and improvements in existing conditions gradually effected The inspection of premises where foods and drinks are prepared or offered for sale was continued it is stated that On Estates subject to medical inspection the housing of labourers medical aid and all other matters concerned with the physical welfare of employees received considered attention

No provision exists for the training of sanitary personnel but it is noted that all the Sanitary Inspectors employed hold the Certificate of the Royal Sanitary Institute London

Port Health Work—Coasting steamers plying between Singapore and Bangkok call at Tumpat where the Chief Hospital Assistant at the Tumpat Dispensary acts as Deputy Health Officer and inspects all passengers during the year 175 steamers with 433 passengers called at the port but no case of infectious disease was recorded.

Hospitals Dispensaries etc—Hospitals maintained by the Medical Department remain as previously described except that it is necessary to add that certain extensions to existing buildings were completed during the year (see this *Bulletin* 1937 Supp p 192* and 1938 Supp p 198*) In addition to the Out-patient Departments established at all Hospitals there are Dispensaries at five centres 2 *Motor Travelling Dispensaries* 2 Outboard *Motor Prahu Dispensaries* and 2 *Pack Dispensaries* The volume of work dealt with by Hospitals and Dispensaries during the year may be set out as follows —

Institution	Admitted	Treated	Deaths	Out patients	Attendances
Hospitals	6,358	6,063	249	40,037	52,292
5 Dispensaries	—	—	—	41,063	66,500
6 Travelling Dispensaries	—	—	—	—	100,489

Information concerning disease incidence in the State is available only from the records maintained by Hospitals Dispensaries and Travelling Dispensaries reference to some of the diseases treated during the year is made in the notes which follow

Malaria is the principal disease and chief cause of death in the State—it is mainly prevalent in the foothills of Ulu Kelantan and is endemic on most of the rubber estates lying along the banks of the Kelantan River During the year under review there was a marked increase in the number of malaria cases admitted to hospitals attributed in part to the Japanese Iron Mine at Temangan where

one of them employed by the Nippon Mining Company, Dungun. The volume of maternity work dealt with at various centres can conveniently be set down in the following manner —

Centre	Maternity Cases Conducted.					Maternal Deaths
	Malays	Chinese	Indians	Others	Total	
Kuala Trengganu Hosp Town Clinic (Japanese Midwife)	13	84	4	1	102	1
Besut (Malay Midwife)	61	37	1	2	101	0
Dungun (Indian Midwife)	50	4	1	0	55	0
Kemaman (Chinese Midwife)	1*	19	0	0	31	0
	2	57	1	1	61	0
Total	125	201	7	4	330	1

Of the 175 women who made 307 attendances for ante-natal examination at these centres 114 were Malays, 52 were Chinese, 8 were Indians and 3 were members of other races.

At the Kuala Trengganu Town Clinic 69 patients attended for ante-natal treatment, 225 infants under one year of age and 1,117 children between the ages of one and twelve years also attended for treatment. It is hoped to build up gradually child welfare services in the districts with the assistance of local midwives. It is interesting to note that infant mortality rates are high in the south and much lower in the north of the State while highly malarious inland districts show lower rates than urban areas. Malaria would not therefore seem to be the major factor in the problem of infant mortality—in inland districts where money is scarce breast feeding is the practice but in the towns sophisticated foods replace the natural method.

School Hygiene.—Twenty-three Government Schools and ten Private Schools were inspected during the year and 2,148 children medically examined, which means that 85 per cent. of the children on the registers were dealt with. Of the total children examined 1,232 were in Kuala Trengganu schools. Pupils showing enlarged spleens formed 3 per cent. of the total examined. Spleen rates for coastal towns ranged from 0.8 per cent. to 27.4 per cent. and for inland areas between 2.8 per cent. and 42.9 per cent. Signs of yaws were noted in 3.8 per cent. of the children examined, mostly tertiary lesions of the hands and feet. Dental caries was noted in 50 per cent. of the children. A great number of the pupils are said to be infected with worms in faecal specimens of 116 pupils in Kuala Trengganu 111 were positive with ova.

Public Health Sanitation, etc.—There are now Town Boards at ten places (see this Bulletin 1938 Supp. p. 202*). During the year the Medical Officer was appointed Health Officer, Kuala Trengganu. Assistant Health Officers were appointed at Chukai and Dungun and in smaller places Dressers act as Health Inspectors. It is said that the larger towns are free from malaria and that anti-malaria measures are most needed where such are most difficult to implement. Mosquito surveys were carried out by Health Inspectors in various areas. As regards sewage disposal a "double pail" system was inaugurated in Kuala Trengganu superseding the former system, and

in Kuala Dungun and Chukai the conservancy systems were extended elsewhere conditions remain unchanged (see this *Bulletin* 1937 Supp p 196*) Disposal of refuse is by controlled tipping in the larger towns and by burning and burying in the villages. The position in respect to water supplies remains as previously described (see this *Bulletin* 1937 Supp p 196*) In the crowded parts of Kuala Trengganu water sold by bullock cart is obtained from wells potentially dangerous.

Housing and Town Planning matters continue to engage the attention of the Town Boards and progressive improvement is reported. With regard to *labour conditions* three mines have small hospitals and employ dressers and a fourth has a large hospital and dispensary and employs a qualified Indian sanitary inspector and staff of coolies. Health conditions on estates are said to have been greatly improved lines have been reconstructed and piped water supplies installed, crèches for children established and anti malarial works undertaken. All mines and estates were visited by the Medical Officer or by Assistant Medical Officers and Sanitary Inspectors during the year. Premises licensed for the manufacture and sale of foods and drinks are regularly inspected by Health Inspectors.

Port Health Work—The passengers and crews of 241 junks were examined and special precautions taken in view of the continuance of cholera in Siam.

Hospitals Dispensaries etc—Additional accommodation was provided by the completion of new buildings during the year. These included new wards to the Kuala Trengganu Hospital the first ward of a new hospital at Kuala Dungun a ward at Chukai Kemaman Hospital where a new hospital is being built. With these additions there are now 213 hospital beds available for in patients. The work performed at all hospitals during the year is detailed hereafter—

Hospital	Beds	Admissions	Treated	Died
Kuala Trengganu General	158	2 622	—	49
Kuala Dungun	7	64	—	1
Chukai Kemaman	20	453	—	7
	23	275	—	9
Totals	213	3 414	3 538	66

For the treatment of out patients permanent *Dispensaries* are established at 7 centres (these also include Out-patient Departments at Hospitals) there are 6 *Travelling Dressers* who deal with cases in outlying villages *vaccinators* who distribute medicines during their visits and 11 *Police Stations* and 4 *Customs Stations* situated in places where there are no dispensaries supplied with stocks of simple drugs. Patients treated during the year were—

By <i>Dispensaries</i> and <i>Travelling Dressers</i>	New Cases.	Attendances
<i>Vaccinators</i>	125 740	157,853
<i>Police</i> and <i>Customs Stations</i>	15,822	16,571
<i>Hospitals</i> maintained by <i>Mining Companies</i> and <i>Estates</i> have been referred to in the <i>Section Public Health</i> above.	863	863

The most reliable information as regards the *incidence of disease* in Trengganu is supplied by the statistics of patients treated at Hospitals

and Dispensaries and the notes which follow briefly summarize references to some of the prevailing diseases discussed in the Report under review.

The incidence of *malaria* varies widely in different parts of the State these variations being indicated by the spleen rates recorded at the medical examinations of school-children (see *School Hygiene* above). During the year under review there were 579 admissions to Hospitals for the disease (representing 17 per cent. of the total admissions) and 587 patients were treated for malaria with 8 deaths. For the total cases treated types of infection were distributed as to 188 *subtertian*, 113 *benign tertian*, 24 *quartan*, 12 were mixed infections, 13 malarial *cachexia* and 237 were unclassified. Out-patients treated at Hospitals and Dispensaries totalled 20,860. No case of *blackwater fever* was recorded.

Mining Companies with an average monthly population of labourers and their dependants of 5,042, reported 1,247 cases of malaria and 8 deaths. *Estates* with an average monthly population of labourers and dependants of 2,180 supply no record of malaria cases but report 7 deaths due to this cause.

It is of interest to note that in the State as a whole only 84 deaths were medically certified as being due to malaria, while 2,677 deaths were ascribed to unspecified fevers. 19 of the latter were stated to be due to *demam hepatis* which means a long continuous fever and might be enteric or typhus but no cause can be assigned to the remainder (see also this *Bulletin* 1938 Supp. p. 203*).

At the Laboratory where 4,180 blood films were examined, 3,603 gave negative findings; the positives included 290 *P. falciparum*, 228 [*P. 221*] *P. vivax*, 33 *P. malariae* and 33 mixed infections.

No case of *plague*, *cholera*, *smallpox* or other dangerous infectious disease was reported. During the year 12,304 anti-smallpox vaccinations were performed and of these 11,742 were primary vaccinations.

Three non-fatal cases of *tropical typhus* were treated at Hospitals; all diagnoses were confirmed by serological tests and typed as to 2 Scrub type (*Proteus* X K strain) and one "Shop" type (*Proteus* Y W strain).

Only 9 (non-fatal) cases of *enteric fever* were reported. At the Laboratory where 26 Widal reactions were performed, in 5 cases the serum agglutinated positively with *Bact. typhosum* and 1 with *Bact. paratyphosum B*. Sixty-two in-patient and 196 out-patient cases of *dysentery* were dealt with. 19 of the in-patient cases and 24 of the out-patient cases were amoebic dysentery. Six Hospital deaths were ascribed to the disease. On *Mines* and *Estates* 38 cases of dysentery were recorded. Among 4,239 faecal specimens examined at the laboratory 13 were found to contain the protozoon *E. histolytica* alone or with other infections.

Fifty-one deaths in the State are said to have been due to *tuberculosis*. It is noted there were 78 in-patient cases of tuberculosis (all forms) and of these 74 patients were suffering from the *pulmonary* form of the disease and 17 died (i.e. 28 per cent. of total hospital deaths). The majority of the patients were Chinese. At the laboratory where 492 specimens of sputum were examined 70 were positive with *Mycobacterium tuberculosis*.

Beriberi was less prevalent during the year under review. Deaths due to this cause in the State as a whole numbered 23. Cases treated by the Medical Department totalled 1,190 and of these 117 were

in-patients of whom 2 died. On Munnig properties 291 non fatal cases were reported. Incidence is said to be greatest among the Chinese in women it is usually noted after a confinement it is rare in the interior where home-grown rice is the staple diet but common on the coast. The low mortality is partly attributed to the fact that all cases were treated with concentrated injections of Vitamin B₁.

Helminthic infections are very prevalent 72 per cent of the 4,239 faecal specimens examined at the laboratory had some kind of helminthic infestation which was usually multiple with *ancylostoma* present in 27.4 per cent, *ascaris* 52.3 per cent and *trichuris* 45.2 per cent. Hospital Returns show 111 in patient cases of *ankylostomiasis* and 143 of *ascariasis*.

Leprosy.—During the past five years a register has been kept of all lepers coming to the notice of the Medical Department. Of the 90 persons recorded over the period 29 have died 10 have left the State 6 are at the Leper Settlement Sungai Buloh (Selangor F.M.S.) 16 cannot be traced and 30 are known to be alive.

Veneral Diseases.—It is said that *sypilis* is rarely seen among local Malays and that the majority of the cases are Chinese. Admissions to hospitals with distinction as to race were as follows —

	Malays	Chinese	Indians	Others	Totals
Gonorrhoea	103	54	44	0	201
Syphilis	3	22	7	1	33
Soft Sore and Granuloma venereum	9	11	9	0	29

In addition to the above 1 018 persons received out patient treatment for gonorrhoea. The figures are said to be no measure of the incidence of the disease which is believed to be very common in the towns. Cases of yaws treated during the year were in-patients 231 and out-patients 3 694 (see also *School Hygiene* above).

Laboratory Returns show that out of 244 Kahn tests 50 were positive and that 204 out of 388 specimens were positive with *N. gonorrhoeae*.

Other diseases dealt with by the Medical Department included 4 797 cases of influenza a few cases of mumps chickenpox measles and whooping-cough 377 in patient cases of ulcers and upwards of 200 of wounds and fractures. Menaces to life other than those contributed by disease are evidenced by the mention of 8 persons killed by tigers 1 by an elephant and 1 by a snake.

Scientific.—The Kuala Trengganu Hospital is equipped with a laboratory and all permanent dispensaries are supplied with microscopes for the confirmation of clinical diagnoses. Specimens examined and findings recorded are summarized in an Appendix to the Report under review and have been referred to in the preceding notes.

Financial.—Total expenditure on Medical Department services during 1937 amounted to \$112,516 a sum which represents 4.2 per cent of the total revenue of the State (or 4.3 per cent. of the total State expenditure) during the same year.

P. Granville Edge.

REVIEWS AND NOTICES

RODENWALDT (Ernst) [Dr med., o. & Professor der Hygiene in Heidelberg] *Tropenhygiene*. [Tropical Hygiene]—pp ix+146. With 11 figs 1933 Stuttgart Ferdinand Enke Verlag [Unbound Rm. 8 Bound Rm. 9 60] [Review appears also in *Bulletin of Hygiene*]

The author has had a long tropical experience and his conclusions from it are embodied in this book. This is not one of those manuals to which people can turn for detailed instruction on practical measures of hygiene in the tropics, but the author expresses views which are of much general interest.

Climate, fitness for service settlements and housing, diet, water, refuse and excreta, clothing and bodily activities are dealt with in that order, the subject matter being in two subdivisions, the first applicable to Europeans and the second to the indigenous peoples.

Acclimatization of Europeans in tropical regions is a topic which should be considered from the individual as well as from the racial point of view. The tropical area is to be thought of not as a place lying between two rigid lines but rather as a series of regions, often disconnected, which possess certain meteorological characteristics as regards rainfall, atmospheric humidity, solar radiation and temperature. Many conclusions formerly reached about climate were really based on the effects of disease on the individual. That the blood, light-eyed northern European type with a tendency to corpulence is less well adapted for life in the tropics than the dark-haired, dark-eyed southern European is an idea that belongs to the early days of tropical hygiene.

The healthy European woman can live in the tropics, and the more normal in respect of health conditions life in the tropics is made the less need married life there suffer from that at home. Government and private concerns sending out a man even for his first tour should ensure that he can take a wife with him. The unmarried man of inferior education usually falls under the degrading influence of a half-coloured household, and the educated man often finds himself forced to lead a dual life—he may become so entangled in the end that he cannot marry a European. Under pressure of such conditions many able and carefully selected men fail to leave any issue, a deplorable loss of the best stock.

The author discusses the subject of health propaganda, especially in relation to the indigenous peoples. He takes an optimistic view largely as a result of his own experience in this matter. He thinks it essential that the methods adopted should be developed gradually from beginnings which will aim primarily at obtaining the co-operation of the people. Successful treatment of their most troublesome diseases is one of the easiest beginnings in gaining their confidence. A common cause of failure is trying to teach too many things at a time, and another is extending the effort over too large an area. He refers with approval to the methods employed by the workers of the Rockefeller Foundation. In particular he mentions the successful work of HYDRICK in Java as a useful model (see *Bulletin of Hygiene* 1937 Vol. 12, p. 674). He fully recognizes that where millions of widely distributed rural dwellers are concerned the progress of the prevention of disease along the present lines must be slow.

D B Blacklock.

Ghosh (Brendra Nath) [M.B.E. FRFP & S (Glasg)] *A Treatise on Hygiene and Public Health with Special Reference to the Tropics*. Ninth Edition—pp xvi+720. With 169 figs. 1938. Calcutta Scientific Publishing Co [15s] [Review appears also in *Bulletin of Hygiene*]

This edition, the ninth of Ghosh's *Hygiene and Public Health*, appears only three years after the previous one but nevertheless it contains much new material. Several chapters have been largely rewritten and others revised incorporating recent knowledge. For writing and revising the different sections the author acknowledges his indebtedness to various workers—MEGAN relapsing fever typhus epidemic dropsy and beriberi—WILSON maternity and mental disorders—BERKLEY HILL and MAITTI mental hygiene and mental disorders—LAL vital statistics—WILSON food and diet in India. He also expresses indebtedness to STEWART for generous assistance and co-operation.

Means for the prevention of the spread of tuberculosis are being seriously considered in India as elsewhere in tropical and sub-tropical regions. The mortality from tuberculosis has been steadily rising in India especially in the cities and towns owing to a combination of factors mostly social and economic. In Peshawar city out of 75 000 persons examined in 1927 3 000 were detected as suffering from active tuberculosis.

Leprosy is one of the important diseases in India the estimated number of cases being a million. Of these 80 per cent are non-infectious 10 per cent slightly infectious and 10 per cent highly infectious. The young being the most easily infected it is above all necessary to adopt preventive measures to immunize this risk.

No lice no relapsing fever is an axiom is perhaps somewhat of an over simplification especially as tick borne relapsing fever is described immediately after this. The frequent application of kerosene and oil recommended by the author is a more promising method of getting rid of lice and nits than the usual perfunctory dip in a bath of chemical solutions so dilute that they do not affect the eyes.

With regard to yellow fever which may be one of India's greatest problems of the immediate future the rôle of mosquitoes other than *Aedes aegypti* might have been given more prominence. The prevalence of rural yellow fever in South America may later have its counterpart in the East. In the same connexion it might be advisable to discuss the possible advantages of protective inoculation on a large scale as a measure of public security against yellow fever. The author is apparently unresponsive to the hints of the reviewer of the 8th edition on the yellow fever section or else it may be unrepentant.

The increasing realization of the importance of closer attention to maternity and child welfare is evidenced in the section contributed by Dr Jean ORKNEY. Village sanitation is becoming such an all pervading problem to the public health departments in India that no doubt it will be worthy of receiving increased space in future editions.

The present volume is one which can be recommended to students. In it they will find something of assistance in relation to the public health on almost any of the multifarious subjects of which they will be called upon to display some knowledge. Everyone engaged in public health practice in the tropics and sub-tropics will also find this new edition a useful guide.

D B Blacklock

honourable mention. The Chemical Section (IV) comprises the greater part of this book. Technical and detailed, of great importance to clinical medicine, it is nevertheless intelligible only to expert chemists.

Paradoxical as it may seem that in searching for some *raison d'être* for chemotherapeutic research it is necessary to state that many outstanding discoveries were made independently of each other and without any reasoned connexion. Among these we may place the discovery of *germanin* by ROEHL in 1916 *arsen-stibamine* by BRAH MACHARI in 1922, *fuadin* by H. SCHMIDT in 1928 *plasmogwina* by SCHULEMANN SCHONHOFER and WINGLER in 1928 and lastly that of *ac-trin* by VIETZSCH MAUS and KIEUTH in 1930. Thus we are presented with the paradox of achievement outstepping chemotherapeutic theory.

The chemotherapy of arsenicals as well as quinoline derivatives in malaria *emacina* and *quinoral* in amoebic dysentery is explored in great detail. Helminthologists will find satisfaction in a similar examination of the various anthelmintics usually employed and research workers will assuredly discover in the elaborate *Toxicity Table* which forms an appendage a sure shield in time of trouble.

This comprehensive work is well annotated and the many references to British workers are a compliment to their activities in this field. Its compilation has entailed an immensity of labour and it has succeeded, in the avowed object of its author in stimulating thought and as an inspiration for future endeavour. The text is singularly free from errors and the one slip discovered is on p. 131 in the spelling of "Mietzsch."

Philip Manson Bahr

LEWIS'S MEDICAL AND SCIENTIFIC LIBRARY Catalogue of Lewis's Medical & Scientific Lending Library Part I.—Authors and Titles. New Edition. Revised to the end of 1937—pp 8+550 1838. London H K Lewis & Co Ltd. 138 Gower Street, W.C.1 16s (to Subscribers 8s) [Review appears also in *Bulletin of Hygiene*]

The founding of Lewis's Medical and Scientific Lending Library in 1848 goes back to within a very few years of the time when CARLYLE driven to distraction by the hours wasted in waiting for books at the British Museum successfully agitated for the founding of a lending library for the use of scholars. Possibly Carlyle's plea which led to the founding of the London Library suggested the usefulness of a lending library of medical books for hard-pressed practitioners and thus brought about the establishment of Lewis's library. Whether this be the case or not the appearance of a new edition of Lewis's Library Catalogue revised to the end of 1937 is a welcome reminder of the growth and continued usefulness of this library. The Catalogue is of books available in the library and is estimated to contain about 20,000 titles. Counting the large number of duplicates of all the most frequently required works the number of volumes in circulation and in the library to-day must be over 60,000 and expressed in terms of money a subscriber to Lewis's library has available for his study a collection of standard medical and scientific books worth something like £50,000.

R. L. S.

TROPICAL DISEASES
BULLETIN.

[Vol 36]

1939

[No 3]

SUMMARY OF RECENT ABSTRACTS *

III MALARIA

General

JAMES (p 255) gives a general account of the progress of malariology during the past 20 years in connexion with malaria in man, monkeys and birds and EDGE (p 256) brings together the information contained in the British Colonial Medical Reports for 1935 on the prevalence of the disease

Epidemiology

DECOURT (p 511) considers that other things being equal the severity of endemic malaria varies inversely with the density of the population affected which explains why it is less severe in towns than rural areas and why increase in rural population with more intensive cultivation tends to decrease anopheline prevalence. He discusses the cost and procedure of bonification

STRATMAN THOMAS *et al* (p 257) in Cyprus found infection with *vivax falciparum* and *malariae* but principally *vivax*. Spleen and parasite indexes were highest at altitudes of 1000-1500 feet but above 2000 feet the parasite rate was considerably higher than the spleen rate. The malaria problem of Cyprus is essentially a rural problem

GROOTINGS (p 902) discusses the increase in malaria which followed the improvement in housing which was undertaken as an anti plague measure in the Dutch East Indies. Mosquitoes are more prevalent in the new houses than in the old which may be due to a better environment for them than formerly or the possibility that the biological equilibrium of the population has been disturbed by the creation of breeding places during the construction of the houses may be the predominant factor. The procedures advised to prevent malaria arising from this necessary anti-plague house improvement will be given in the section on prevention. ROSIER (p 417) describes how this house improvement and reconstruction for the prevention of plague in Java has led to increased malaria. The factors are engineer

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1939, Vol 35. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

ing works, an immigrant population, an endemic area, borrow pits and rubbish heaps.

LEGENDRE (p. 511) in Cambodia found *falciparum* and vovax infections occurring sporadically in the thickly populated areas on river banks. FARNAUD (p. 808) reports that malaria in the deltas and on the coast of Indo-China is much less severe than in the hyperendemic hilly interior but that severe outbreaks may occur. A sudden increase in morbidity has been accompanied by an equally sudden increase of salt water breeding anophelines, of which the most important is *A. sinensis*.

VICKERS and STRAHAN (p. 416) report that Alor Star in Kedah, in spite of rice cultivation, swamps and abundance of anophelines is relatively non-malarious with spleen and parasite rates of 1.9 and 2.3. Rice cultivation in hilly areas on the other hand, is sometimes associated with hyperendemic malaria. LEFÈVRE (p. 809) in Laos finds malaria to be hyperendemic. The vast majority of the population are infected in early life and repeated infection leads to the immune state. Clinical manifestations are therefore uncommon and not severe. Healthy carriers abound and constitute a great danger to non immune immigrants. MARTIAL (p. 727) in Tonking found malaria to be most prevalent near the limestone hills and most severe amongst the immigrant Annamese population. Incidence diminishes when temperature falls below 18°C. and increases when it rises above 20°C.

GENEVRA, TOUMANOFF and HOANG-TICH TRY (p. 806) observed in a severe epidemic in a village of Tonking that the highest spleen rate was only 24 per cent. whereas the parasite rate was 90 per cent. and the gamete rate over 80 per cent. *P. falciparum* was most in evidence.

ANDREWS and CHU (p. 509) near Shanghai found parasites in the blood of 8.0 per cent. of school-children in autumn and 1.7 per cent. in spring. In all 7,766 bloods were examined.

SPILLENGREY, DE BOCK and KRAAN (p. 659) regard as good carriers those who show one parasite or more per 100 leucocytes. They investigated 31 families in North Holland and found that the proportion of good carriers was about equal in children who had and those who had not had fever that year but that it was much higher among adults who had had fever than among those who had not. KLIGLER and MER (p. 99) point out that in the case of *P. falciparum* and *P. malariae* the most infective carrier was not necessarily the one with the greatest number of gametocytes. CLARK and LOMP (p. 806) found that a certain number of carriers were missed during surveys in an unimmunized area in Panama, and that these are enough to keep up transmission in communities where drug treatment was used and where anti-mosquito measures were impossible. Crescent carriers were more numerous in the atabrin-plasmoquine treated group than in the unsupervised controls who received only quinine but that may have been due to heavier infections. Only 8 of 59 infants under 1 year were infected. SAUTET (p. 259) finds that adult foreigners in Corsica often play as gamete carriers, an important part in spreading infection. Children are also such carriers. Vovax infections occur mainly in spring *falciparum* in autumn and *malariae* in winter but the latter are much less common than the two former.

SCHWETS and GERONNET (p. 804) examined a large number of blood films, especially of children in the Belgian Congo. In the intensely malarious regions infection begins a few weeks after birth.

is almost universal at 6 months and the parasite index decreases gradually after the fifth year. *Falciparum* infections are the most common, *vivax* the least and *malariae* intermediate. *Falciparum* infections can be found at all ages. In the coastal region incidence is less though the general trend resembles that described above. DUREN (p 22) in the Belgian Congo found that the mean annual morbidity rates for Europeans fell from 220 per thousand in 1918-20 to 141 in 1931-34 and the mean mortality from 6.39 to 1.82 in the same periods. In the native population malaria causes 16.5 per cent of deaths in the age group 0-3 years. At high altitudes where malaria is only mildly endemic serious epidemics with severe and fatal cases of haemoglobinuria occur for example in Ruanda Urundi.

LEGA RAFTAELE and CANALIS (p 509) in Italian East Africa found that malaria was very prevalent at altitudes of 1 000 to 1 200 metres, with spleen rates up to 90 per cent. *Falciparum* infections were the most common. In the plains incidence was lower but still great with predominance of *vivax* infections. MIRA (p 610) found in the inhabitants of part of Abyssinia spleen indexes from 4 to 33 per cent and parasite indexes from 10 to 12. *Vivax* infection was commoner than *falciparum*. PIETRO (p 510) in Eritrea found three-quarters of the malaria to be due to *falciparum*, the remainder to mixed *falciparum* and *vivax* infections. Abnormal Nile floods probably accounted for the increased prevalence in Egypt in 1935 (p 96).

ROOT and ANDREWS (p 805) in Grenada found that the spleen index alone was not a reliable index of malaria prevalence. Other causes of splenomegaly were found. The incidence of malaria is not high [See also WILSON this Bulletin 1935 Vol. 32 p 109].

FAUST (p 811) from mortality records in the Southern United States for 1936 found an increase in three States especially the coastal regions but a decrease in the Mississippi delta. The average mortality is higher than 10 years ago and the disease is spreading but the factors causing this are unknown. DAUER and FAUST (p 20) show that in the South East United States the mortality rates in 1935 showed a tendency to decline in the worst endemic areas and to increase elsewhere. FAUST (p 259) states that mortality data are very poor in the southern United States and pleads for greater accuracy in diagnosis, treatment and recording. Whereas it has been estimated that for each death caused by malaria there are at least 200 cases in one State only two cases were reported for each death. This is a serious discrepancy.

Actiology

BOYD and KITCHEN (p 263) found that the incubation period of *falciparum* infections transmitted by *A. quadrimaculatus* varied from 6 to 25 days and that the variations were due to the different strains used.

ALEXEIJEW and KOVACHOV (p 101) found evidence of binary fission in the female nucleus in *falciparum* crescents. CASINI (p 27) describes senescent forms of crescents in *falciparum* infections which have lost the power to infect anophelines. They most commonly occur in chronic cases.

RAFFAELE and LEGA (p 418) recognize morphological characteristics which are described justifying the appellation *P. falciparum* var. *aethiopicum* of a strain found in Italian East Africa. In this strain the

ring forms are less constantly circular the chromatin granules coarser and pigment appears later than in typical forms. Also the crescents are shorter and broader and, especially, the male gametocytes less falciform flagellation occurs earlier in 3-5 minutes as compared with 15-20 for typical strains.

NUCCIOTTI (p 895) notes that the designation *immaculatum* has been given to the strain of *falciparum* commonly seen in Italian East Africa. It is strictly comparable with the Italian strain from the point of view of relapse production following primary infection.

BOYD and KITCHEN (p 425) infected two patients simultaneously with *P vivax* and *P falciparum*. At first *falciparum* was most in evidence with characteristic clinical features. Later *vivax* was dominant and *falciparum* decreased in numbers suggesting antagonism but in one case *falciparum* reappeared and both remained at a low equal density. ANTSCHELEWITSCH (p 39) found that blood containing parasites and mixed with various solutions containing glucose citrate and other salts may remain infective if used for transfusion up to the eighth day. *Vivax* infected blood was largely used in this investigation, which is important both in the matter of transfusion and as a means of inducing therapeutic malaria.

IVANIĆ (p 101) describes stages in the nuclear division of *P vivax* which take place by a process of mitosis.

BOYD and KITCHEN (p 261) think that the frequency of renewed clinical activity after the cessation of the primary attack varies with different *vivax* strains. They worked with the McCoy strain.

FRIEDMAN (p 100) found certain changes in *P vivax* examined in dry blood films stained by various Romanowsky methods, which produced resemblances to *P ovale*, *P cameroni* and parasites of monkeys. HAGER (p 101) found that a strain of *P ovale* during the course of repeated passages showed a tendency to assume characters of both *P vivax* and *P malariae* but does not consider that it is merely a variety of *P vivax*. ESKIN (p 814) describes a case of infection with *P ovale* in Russia the first contracted in Europe to be reported. *Vivax* infection was also present but the two could easily be distinguished, and in five successive passages through G.P.I. patients *P ovale* could be seen. The diagnosis was confirmed by WERNOV and HOARE.

CIUCA *et al* (p 428) record that 79.8 per cent of 158 general paralytics were successfully infected with *P knowlesi*. The illness produced was usually mild but HALLIF *et al* (p 429) show that immunity against reinfection was absolute. Patients treated by *vivax* infection were completely resistant to *vivax* and partially so to *knowlesi*. The authors therefore postulate both common and specific antigenic factors.

BARBER and RICE (p 724) in Poona found the following percentages of splenomegaly in children harbouring the parasites named—*vivax* 57, *falciparum* 66, *malariae* 84 and mixed 100.

[A table showing the proportions of infection by the three principal plasmodia was constructed from the abstracts giving such information, but was considered to be too incomplete to be useful. Readers are referred to the original abstracts on this subject.]

Transmission

BEKLEMBICHEV and ZHELOCHOVITSEV (p 691) have found *A. maculipennis* as far north as lat. 66°N. Its southern extension in Asia and Africa is determined by the heat of the summer. POKROVSKI

and POLIKARPOVA (p 194) found that *A. maculipennis* is transported into cities on steamers on the Volga and consider that this fact undoubtedly has epidemiological significance.

In Normandy as a result of the study of the eggs of *A. maculipennis* ROUBAUD *et al* (p 571) consider that crossing has taken place between *typicus* and *atroparvus*. This has hitherto been supposed to be impossible.

MOSVA (p 189) records investigations into rate of development of two races of *A. maculipennis labranchiae* and *atroparvus* under controlled conditions of temperature. SAUTET (p 192) found that both *A. maculipennis labranchiae* and *A. elutus* in the hot weather in Corsica show a preference for outdoor existence and believes that malaria is contracted in the open air more commonly than is generally supposed. POLEZIAEV (p 190) shows that the average numbers of *A. maculipennis* seen varied indirectly with the intensity of light in the cowsheds and stables examined. CORRADETTI (p 426) investigated the food preferences of the races of *A. maculipennis* var *mescae* never exhibits Jugoslavia found that *A. maculipennis* var *mescae* never exhibits the leanings towards exclusive zoophilism which it does in other parts of Europe. RICE and BARBER (p 39) in Macedonia found that *A. maculipennis* and *A. superpictus* are attracted to domestic animals whereas *A. elutus* is indifferent as regards choice of human or domestic animal sources of blood. Sporozoite indexes were *elutus* 7.7 *maculipennis* 0.3 when the two species were collected on the same day in the same house or stable.

SWELLENGREBEL DE BUCK and KRAAN (p 425) in North Holland found that the natural rate of infection of *A. maculipennis atroparvus* is 118 times higher than that of *mescae*. In autumn the Anopheles spread malaria from man to man and the parasites are kept alive in man until the next transmitting season.

PAPADAKIS (p 195) investigated the biology of *A. superpictus* in Greece and (p 196) describes its breeding in warm shallow sunlight collections of water. STRATMAN THOMAS BARBER and CARTER (p 257) in Cyprus found infected *superpictus* in March probably surviving in overwintering females. The bulk of transmission takes place from June to September but some occurs in autumn. Winter transmission probably does not take place.

KLIGLER and MER (p 99) experimenting with *A. elutus* found that it was most susceptible to infection with *P. vivax* and least to *P. falciparum* though development was slowest in the case of *P. malariae*. Atebrin like quinine does not deprive crescents of their capacity to develop in mosquitoes.

DE BUCK (p 663) details observations on the secretions of the salivary glands and stomachs of *A. maculipennis Th. annulata* and *C. pipiens*.

DE MEILLOV (p 194) has been successful in maintaining *A. gambiae* in culture in the laboratory by using a large cage heated to 25°C and offering a small pig as food. He has (p 662) found evidence to suggest that providing *A. gambiae* can obtain blood every night it can survive continuous exposure to very low humidity (20 per cent at 26°C). The same author (p 662) in Northern Rhodesia found that *A. funestus* may fly up to 2.8 miles down wind. The breeding habits of *A. gambiae* and *A. funestus* are constant in different parts of Africa. GEBERT (p 193) in Mauritius found that to destroy the eggs of *A.*

gambiae in tanks, etc. in gardens, the common practice of emptying them for a few hours is insufficient. A period of 4 days is necessary.

Experiments were conducted in Bengal (p. 39) to discover why *A. culicifacies* the chief vector elsewhere in India, is relatively a failure as a vector in Bengal. It was found that breeding in the muddy water with aquatic vegetation usually found in Bengal was difficult. The investigation continues. SWEET (p. 85) found that *A. culicifacies* though the most prevalent anopheline in Mysore, is not strongly attracted to human beings as a source of blood.

SWEET and RAO (p. 426) recognize two forms of *A. stephensi*—the B or type form, first recognized in Bangalore, apparently anthropophilic and probably the urban vector and the M form, first obtained in Markanave apparently zoophilic and possibly the rural form and a poor vector. The authors propose for the latter the name *A. stephensi* var. *mysorensis*.

SEN (p. 188) gives the percentages of 11 species of anophelines caught in a total of 15 453 during one year in houses and cattle sheds in Bengal. For details the full table should be consulted.

LEFÈVRE (p. 801) shows that in Laos *A. minimus* breeds particularly in moderately hilly country but is rare in flat low-lying places. It is adaptable and can breed in stagnant as well as stream waters and this adaptability probably explains why in *minimus* areas malaria is constantly hyperendemic. Malaria transmitted by other species in Laos tends to be seasonal. TOUMANOFF (p. 568) found sporozoites and cysts of *falciparum* in *A. minimus* persisting after several feeds on buffalo.

GASCHEN and RAYNAL (p. 192) found that *A. nigus* in Indo-China is very definitely zoophilic. In the absence of human blood, *minimus* and *jeyporensis* feed on bovines. *A. acuminatus* is markedly zoophilic but in parts of Tonking shows anthropophilic tendencies. HU and YU (p. 197) found in Shanghai that *A. sinensis* showed a marked preference for domestic animals. CHANG (p. 197) in Kiao-chiao found that *A. sinensis* though multidentate frequently contains human blood. TOUMANOFF and HOANG-TICK TRY (p. 680) explain the anophelism without malaria found in the health resort of Chapa, Tonking by the zoophilic tendencies of the anophelines.

TOUMANOFF (p. 661) shows that rainfall is more important than other meteorological factors in determining the seasonal prevalence of anophelines in Indo-China.

GENEVRAI *et al.* (p. 809) in Tonking found that old borrow pits made during the construction of a bund were the most important anopheline breeding places. There had been a severe epidemic of malaria in Ha-tri, a village in the Tonking delta. Precipitin tests carried out on engorged mosquitoes showed that 41 per cent of *acuminatus* and 35 per cent of *hyrcanus* caught in human dwellings had fed on man and the small number of cattle had intensified the anthropophilism of the insects, which were breeding in large numbers.

BOYD KITCHEN and KUPFER (p. 424) found that *A. quadrimaculatus* can be simultaneously infected with *cruvi* and *falciparum* and can transmit both. ROZENBOOM (p. 807) found in Panama that *A. albatus* is refractory to local *P. falciparum* in contrast to the susceptibility of the Brazilian *albatus* to the Brazilian *falciparum*. The control of malaria still depends on the control of the only really dangerous vector *albatus*. BOYD CARR and ROZENBOOM (p. 659) as a result of experiments in the infection of Anopheles, consider that West Indian

strains of *vivax* and *falciparum* might spread if introduced into the south-eastern United States but that the United States strains would only spread to a limited extent if at all if introduced into Cuba or Panama.

BOYD and KITCHEN (p 195) experimenting with anophelines found that if the stomach wall is heavily occupied by *falciparum* cysts the mosquito will not mature as many infectious sporozoites as will a lightly infected mosquito. This is not the case with *vivax*.

WILLIAMSON and ZAIN (p 198) found that the developmental cycle of the two common malaria parasites and probably of quartan also can proceed to completion in *Culex blaesiorhynchus* but in the absence of proof of transmission no epidemiological conclusion is at present warranted.

[An attempt has been made to construct a list of all the *Anopheles* mentioned in abstracts during the year but since in many of the papers abstracted no mention was made of the capability of mosquitoes to transmit malaria and since without that information a list is of little value the idea has been abandoned. Readers are therefore referred to the original abstracts for this kind of information.]

Pathology

TALIAFERRO and MULLIGAN (p 25) discuss the origin of macrophages which they consider may arise from all cells retaining mesenchymal potencies of development and occur normally in various connective tissues. They do not agree with MALLORY regarding endothelial cells. Phagocytosis is non-specific during natural immunity but in acquired immunity it is in addition specific. When parasites are introduced into an immune animal there is a regional concentration of parasites and increased phagocytic action. Phagocytic activity, lymphoid hyperplasia and cytogenesis of macrophages are initiated in the spleen where they are most pronounced but also occur in the liver and bone marrow. RODHAIN and VALCKE (p 100) in severe *falciparum* infections found that the polymorphonuclear leucocytes especially the young forms were actively phagocytic towards the parasites. This activity is usually displayed by the monocytes.

СИТОВ (p 106) points out that in monkey malaria one morphological species may be made up of a number of different races or strains which do not protect to any extent against each other which vary in virulence and respond differently to therapeutic agents. Similar races have been met in human malaria. The host may have natural or acquired resistance. Thus *Silenus irus* appears to be naturally resistant to a *P. knowlesi* infection usually fatal to *S. rhesus*. Acquired resistance is seen in animals resistant to superinfection due to chronic infection with the same strain. In endemic areas highly susceptible children probably die leaving the more resistant to propagate their kind.

SCHILLING (p 429) discusses the possibility of the production of immunity in children by means of minimal treatment to allay symptoms without interfering with the production of immunity. He suggests lines on which observations should be conducted to determine whether such immunity is possible.

FAIRLEY (p 265) describes the structural and functional changes in the liver which can be attributed to malaria. These cannot be further abstracted. LINTWAREFF (p 24) as a result of the experimental

injection of haemoglobin from untreated malaria patients into guinea pigs came to the conclusion that in malaria there is a specific toxin which combines with haemoglobins and may cause nephritis.

FONG (p 576) found that in 1 012 patients treated with therapeutic malaria two died from rupture of the enlarged spleen though palpable spleens are very rare.

BARBER and RICE (p 724) describe Barber's index of microscopic anaemia based on the number of abnormal erythrocytes stainable in the manner characteristic of retained nuclear material. In thick films stained by Giemsa these appear as blue clouds of which the number indicates the grade of microscopic anaemia.

Clinical

There is some difference of opinion as to the value of examination of bone marrow in the diagnosis of malaria. Thus VOORHOEVE (p 102) established the diagnosis of malaria by sternal puncture in two cases where the blood was negative but MATSUMOTO (p 28) found that parasites are not more numerous in sternal puncture smears than in the peripheral blood and that the plasmodia showed no particular tendency to invade the younger forms of erythrocytes. The marrow picture was normal in cases of malaria. RAFFAELE (p. 514) found non pigmented forms of parasite in the bone marrow obtained by sternal puncture of a man infected 5 days previously with *vivax* sporozoites. Two schizonts were seen, one free and one included in a reticulo-endothelial cell and in one such cell two young trophozoites were found.

KEHR and HARBHAGWAN (p 83) found the average sedimentation rate in normal human subjects in India to be 6.4 mm. per cent. There is a considerable increase during acute phases of infection which cannot be correlated with temperature or splenic enlargement.

Henry's reaction—RAYNAL (p 264) considers this reaction to be of diagnostic value in malaria. It may be positive in non-malarial cases if the Bordet Wassermann reaction is strongly positive. It should be performed on donors for blood transfusion. The reaction is a good index of the success of treatment. VOLAVSEK (p 102) found that Henry's reaction always becomes positive in therapeutic malaria. The reaction is non-specific and is important in liver damage, tuberculosis, carcinoma and syphilis. D'ALESSANDRO (p 28) found that the reaction usually becomes negative after treatment by the Ascoli method. If negative at the beginning it becomes positive and then finally negative. AKASHI and NAKASHIMA (p 264) consider that melanin acts merely as an indicator and not as an antigen in Henry's reaction. The reaction is of great use in the diagnosis of malaria. VILLAIN and DUPOUX (p 27) regard the melanins as the best serological detectors of malaria. They have prepared an artificial melanin combined with iron which they designate M.A. which behaves almost exactly like Henry's melanin. PIKOU and OSKOVA (p 514) replaced the melanin of Henry's reagent by quinine chlorohydrate and other substances, which gave successful results. The reaction is not therefore an immunity reaction but is probably connected with a disequilibrium between the albumin and globulin fractions of the serum. Too much reliance should not be placed upon it in diagnosis. LIVIERATO *et al* (p 515) describe the preparation of an antigen substitute for Henry's melanin. BRUMPT and CHORINE (p 102) record that Henry's reaction in normal uninfected fowls is given in an intensity which in human malaria would be counted as positive. MAYNE (p 284) reports

a patient whose first paroxysm occurred a year after inoculation with a blood culture of *vivax* sporozoites BRACHTEL (p 656) has seen in Bohemia patients in whom malaria appears after long latent periods usually from 7 months to 1 year

BROWN *et al* (p 728) report the occurrence of the Arthus phenomenon from the bites of *Aedes aegypti* in a girl of 15 Other mosquitoes caused less severe reactions. Desensitization and passive immunization were only partially successful The child died of Hanot's cirrhosis.

FISCHER (p 813) describes a patient with a crop of petechiae which he considers to have been due to benign tertian malaria They disappeared under quinine treatment LORANDO *et al* (p 728) describe a patient in whom each attack of *vivax* malaria was followed by urticaria with purpuric patches. CONÇA and BRUCKNER (p 513) saw two patients with *vivax* infection who were admitted to hospital with fever acute abdominal pain severe headache and a generalized urticarial rash Recovery followed quinine treatment.

ACREE (p 24) details symptoms due to malaria which simulate primary disease of the alimentary tract and which are cured by anti-malarial treatment Gastric catarrh peptic ulcer enteritis ulcerative colitis dysentery cholecystitis appendicitis acute peritonitis or typhoid may be simulated and ulcers of the tongue vomiting cramps herpes, urticaria erythema petechiae purpura ulcers and furunculosis may be seen. CANOVA (p 812) reports 3 cases (in 8 000 treated for malaria) in which *falciparum* infection caused symptoms characteristic of appendicitis. All cleared up under treatment for malaria. [Might these not have been appendicular colic in association with malaria?] FARINAUD (p 262) shows that malaria can simulate biliary colic even after the removal of the gall bladder VAUTHEY and VAUTHEY (p 818) consider that in 15 of 100 patients at Vichy malaria was the cause of cholelithiasis and may have been a factor in 16 others. FLEISCHMAN (p 514) considers that malaria has only a predisposing action in the production of cirrhosis of the liver

AKASHI and YOSHIMURA (p 260) in Formosa report albuminuria in 36 per cent and acute nephritis in 10 per cent of 490 cases of malaria and polyneuritis in 7 of 411 cases

JUNIOR and BRANDÃO (p 657) quote 10 cases of malaria in which signs and symptoms appeared to indicate suprarenal involvement with asthenia arterial hypotension muscular pain and digestive disturbance and in one case bronze pigmentation. The prognosis under malarial treatment is much better than in suprarenal insufficiency due to other causes.

MANOHAR and KHOSRAWY (p 513) describe a patient in whom severe anal pain cyanosis, rapid pulse and low blood pressure marked the onset of an attack of malignant tertian malaria GIORDANO (p 656) found that of 415 patients repatriated from Italian East Africa on account of malaria 60 suffered from some form of cardiac disturbance especially acute dilatation

LEO (p 262) reports a case of gangrene of the foot in a patient who showed so heavy a *falciparum* infection that all the red cells were parasitized by two to four parasites.

JOURNE and AUBIN (p 263) describe a patient with psychosis probably due to *falciparum* infection who was cured by anti-malarial treatment. Alcohol may have played some part. LE ROY (p 186) reports the case of a man admitted to hospital in Tunis as suffering

from cerebrospinal meningitis. The C.S.F. however was normal and on the 8th day a heavy *falciparum* infection was discovered. Complete recovery followed quinine treatment. MORR (p 727) describes 2 cases of epilepsy following malaria and stresses the inflammatory disturbance in the brain due to circulating toxins which may include haemorrhages, destruction of ganglion cells and proliferation of neuroglia. Scar tissue may result. Symptoms may resemble those of meningitis and the destruction of brain substance may lead to many disturbances, including epileptiform attacks. WILLOUGHBY (p 513) describes a patient with *vivax* infection whose condition simulated severe chorea. The symptoms disappeared abruptly on treatment with quinine. ROGER and BOUDOURESQUES (p 187) report a case of malarial polyneuritis with paraplegia in a woman who had suffered from repeated attacks of malignant malaria. Cure followed antimalarial treatment. The onset occurred during a febrile attack and the parasite could always be demonstrated in the blood during any exacerbation of the symptoms. HOUSIAU (p 657) describes a case of neuritis of the right radial nerve with *falciparum* malaria, which cleared up under quinine treatment.

THOMAS and SYDENSTRICKER (p 812) in America found that all the deaths in 244 cases of malaria were due to *falciparum* infection with pernicious symptoms. The mortality of pernicious cerebral malaria was 11.86 per cent. of 78 cases. PRICE (p. 97) describes pernicious malaria in 24 children. Three had haemoglobinuria 18 were of the algid type, 7 died.

FONG (p 576) found that of 34 patients dying while undergoing therapeutic malaria, 11 died from acute malaria and that in 2 others the malaria had activated quiescent pulmonary tuberculosis.

GOLDEN (p 574) considers that the primary effect of malaria in general parents is to destroy the spirochaetes.

BOYD and KITCHEN (p 576) used *P. falciparum* for therapeutic malaria owing to the immunity to *vivax* shown by negroes in Florida. The results were satisfactory. Infections during the winter had long incubation periods, short attacks and greatest liability to renewed activity. Infections must be closely watched and quinine given if the temperature exceeds 104-105° or the parasite count is more than 100 000 per cmm. Thorough intensive quinine treatment after the primary attack makes recurrences unlikely. BOHLS and LAWRENCE (p 574) in therapeutic malaria found that with the Mc-Coy strain of *P. vivax* the malaria can, under careful supervision, be allowed to terminate spontaneously and that very few relapses occur.

LOTTE (p 733) maintains that in acute infections vitamin C is used up more quickly than normally and that in benign tertian malaria doses of 1,000 mgm. of the vitamin given intravenously prevent rigors and give a feeling of comparative well-being. The vitamin has anti-toxic and anti haemolytic powers. The author discusses therefore the question of vitamin C therapy as an adjunct in blackwater fever. All recent benign infections give rise to a positive Wassermann reaction.

[To be continued]

C IV

RABIES

A REVIEW OF RECENT ARTICLES XXX*

I. *Virus*

KLIGLER and BERNKOPF¹ have failed to convince themselves that the virus of rabies multiplies in the allantois of the chick embryo. In no case did they succeed in obtaining serial passage beyond the third generation. Whether the virus can be adapted to the chick and its virulence enhanced by passage is a subject for further investigation.

Attempts of the same type have also been made by VEERARAGHAVAN and PHILIPPS² without success. 101 eggs were inoculated but no lesions which were definite enough to be considered as specific were observed. It was not possible to demonstrate the presence of the virus after the first egg passage.

Under the same conditions BADENSKI and BRUCKNER³ have failed to cultivate the virus of AUJESZKY'S disease. In one series the virus disappeared at the 7th passage and in another at the 3rd. They found no evidence of multiplication.

In a second communication⁴ from further experiments with AUJESZKY'S virus they found that a certain degree of multiplication did occur. A maximum was reached in 36 hours and this was followed by a decline which they believe to be due to a process of defence on the part of the membrane.

GERLACH⁵ has applied the fluorescent microscope to the study of the elementary bodies which are believed by some (BABES KOCH etc.) to form a part of the life-cycle of the virus of rabies. A number of microphotographs of these are reproduced. He finds these bodies in the meninges in the central nervous system in the salivary glands and in the serous exudates of the body cavities of animals which have succumbed to street or fixed virus rabies. He has found the same bodies in chorio-allantoic cultures and also in cell-free artificial media cultivated anaerobically. He believes that these bodies are true virus bodies. He states that they are not present in normal animals nor in other virus infections nor even in infections with other neurotropic viruses such as poliomyelitis or AUJESZKY'S disease.

* For the twenty ninth of this series see this *Bulletin* 1933 Vol. 35 p. 641

¹ KLIGLER (L. J.) & BERNKOPF (H.) Cultivation of Rabies Virus in the Allantois of the Developing Chick Embryo—*Proc. Soc. Experim. Biol. & Med.* 1933. Oct. Vol. 39 No 1 pp. 212-214

² VEERARAGHAVAN (N.) & PHILIPPS (G. L. C.) Cultivation of the Rabies Virus on the Chorio-Allantoic Membrane of the Developing Egg—*Indian J. Med. Res.* 1933. Oct. Vol. 26. No 2. pp. 493-495 With 1 plate

³ BADENSKI (G.) & BRUCKNER (L.) Essais de culture du virus de la pseudorage (virus d'Aujeszky) sur la membrane chorio-allantoïde de l'embryon de poulet.—*C. R. Soc. Biol.* 1933 Vol. 129 No 27 pp. 406-407

⁴ BADENSKI (G.) & BRUCKNER (L.) Sur l'évolution du virus de la pseudorage sur la membrane chorio-allantoïde de l'embryon de poulet.—*C. R. Soc. Biol.* 1933 Vol. 129 No. 27 pp. 408-409

⁵ GERLACH (F.) Virusstudien bei Tollwut.—*Zeitschr. f. Infektionskr. u. Haustiere.* 1933 Aug. 12. Vol. 53 No 4 pp. 279-280 With 7 figs. [10 refs.]

Four highly virulent strains of street virus isolated from patients who have died in spite of treatment have been studied by JOXKESCO⁶. Each has been subpassaged and fixed in the rabbit and with subpassage in each case Negri bodies at first numerous, disappeared, as indicated in the adjoining Table in which the figure entered is the incubation period in days, and + or — indicates the presence or absence of Negri bodies.

	Number of passage										
	1	2	3	4	5	6	7	8	9	10	11
Virus Z	{ 11 +	{ 4 —	{ 3 —	{ 3 —							
T	{ 10 +	{ 10 +	{ 10 +	{ 6 +	{ 4 —	{ 4 —	{ 3 —	{ 3 —	{ 3 —	{ 3 —	{ 3 —
B	{ 12 +	{ 10 +	{ 9 +	{ 6 +	{ 4 —	{ 3 —	{ 3 —	{ 3 —			
H	{ 12 +	{ 10 +	{ 9 +	{ 9 +	{ 9 +	{ 9 +	{ 5 +	{ 5 —	{ 4 —	{ 3 —	{ 3 —

All four strains were highly pathogenic when administered subcutaneously to mice (mortality 80 per cent). They were also highly pathogenic on intracerebral inoculation into rabbits infecting in dilutions of 1/700 000 1/500 000 1/300 000 and 1 in 400,000 respectively. Each strain caused symptoms of excitation in the rabbit. There was no evidence of correlation between the incubation period in man and that in the first passage rabbit. These appear to be examples of strains of street virus which already in nature are highly adapted to the central nervous system.

It is well known that the rapid drying of a thin layer of emulsion containing rabies virus gives rise to a powder which conserves its virulence for many months. REYLINGER and BAILLY⁷ have studied the effects of exposing the powder so obtained to various temperatures. It appears that the powder remains potent after 2 minutes at 105°C., 3 minutes at 104° 4 minutes at 103°. One remembers in comparison that ordinary undried emulsions lose virulence after exposure for 60 minutes at 50° and 30 minutes at 60°C. The authors are of opinion that this loss of virulence in suspensions is not due to desiccation but to autolysis. The fact that dried virus does not lose virulence shows that desiccation does not attenuate but rather conserves virulence. They finally remark that the fact that the virus can support temperatures of 105°C. is not in favour of the view that the virus is protozoal in nature but rather that it is chemical.

⁶ JOXKESCO (Démètre). Etude de quatre souches de virus des rues isolées de cas pour lesquels le traitement antirabique a échoué.—*Ann. Inst. Pasteur* 1936. Nov. Vol. 61. No. 6. pp. 827-835. With 1 fig. [14 refs.]

⁷ REYLINGER (P) & BAILLY (J). La desiccation est-elle un facteur d'atténuation du virus rabique?—*C. R. Soc. Biol.* 1938. Vol. 129. No. 25. pp. 133-134.

In a subsequent communication⁸ the same authors show that these properties are not peculiar to rabies virus. The virus of Aujeszky in fresh suspension loses virulence when kept at 60 C. for from 45 to 50 minutes but in the dry powdered state survives for 2 minutes at a temperature of 104.5°C. The virus of equine encephalomyelitis in fluid suspension can stand a temperature of 50°C for 70 minutes but not 51 C for 10 minutes whilst in powder it withstands 112° for 10 minutes.

The fact that man in contradistinction to other mammals only quite exceptionally contracts Aujeszky's disease (this *Bulletin* 1938 Vol 35 p 643) has led NICOLAU CRUVEILHIER TRUCHE KOPCOWSKA and VIALA⁹ to investigate the resistance of the chimpanzee. Successful inoculation of one of these animals had been achieved by three of these authors (this *Bulletin* 1938 Vol 35 p 169). On the third day tremors were observed and temperature oscillated on the eighth day blood was withdrawn and proved virulent when inoculated into the brain of a rabbit. On the 15th day the chimpanzee presented no abnormal symptoms and was killed. Inoculation of two rabbits with brain substance did not reproduce the disease. Histological examination of the brain showed nuclear changes in neurones and glia cells. Chromatin was rarefied and clumped inclusions interpreted by the authors as masses of degenerated inframicrobes were observed. The authors believe this to have been a mild case of the disease characterized by oscillating temperature tremors loss of appetite and ending in cure by auto-sterilization.

In a further communication KOPCOWSKA and NICOLAU¹⁰ illustrate and describe a toxoplasmic cyst found in the cerebrum of the same animal.

GORET and MARIETTE¹¹ add the ferret to the long list of animals which can be infected with Aujeszky's virus. Intraocular intra-cerebral and intramuscular injections were alike successful in giving rise to the disease in this species.

The reviewer would draw special attention to a very comprehensive summary of Aujeszky's disease by GALLOWAY¹² of the National Institute of Medical Research. The treatment of the subject is excellent in every way and is based upon a bibliography of 97 communications.

It was stated by BABES in his treatise that two persons who had neither been bitten nor scratched but had felt the hot breath of a rabid wolf on their faces subsequently succumbed to rabies.

⁸ REMLINGER (P) & BAILLY (J) Action des hautes températures sur les virus rapidement desséchés de la maladie d'Aujeszky et de l'encéphalomyélite des équidés.—*C R Soc Biol* 1938 Vol 129 No 28 pp 460-462.

⁹ NICOLAU (S) CRUVEILHIER (L.) TRUCHE (C.) KOPCOWSKA (L.) & VIALA (C.) Neuroinfection autostérilisée à virus de la maladie d'Aujeszky chez le chimpanzé.—*C R Soc Biol* 1938 Vol 129 No 25 pp 176-178 [11 refs.]

¹⁰ KOPCOWSKA (L.) & NICOLAU (S) Toxoplasmose spontanée du chimpanzé.—*C R Soc Biol* 1938 Vol 129 No 25 pp 179-181 With 1 fig [12 refs.]

¹¹ GORET (P) & MARIETTE (C.) Réceptivité du furet (*Putorius furo* L.) au virus de la maladie d'Aujeszky inoculé par différentes voies.—*C R Soc Biol* 1938 Vol 128 No 22 pp 871-873

¹² GALLOWAY (I. A.) Aujeszky's Disease.—*Vet Rec* 1938 June 18, Vol 50 No 25 pp 745-762 [88 refs.]

of the whole dog population of Singapore island the number of which was estimated at about 13,000. Between August and November 41 dogs brains were sent to the laboratory for examination, and 12 proved to be positive. The last positive result was obtained in November. The number of human patients treated in 1937 was 169 as compared with 21 in the previous year. No deaths occurred but one case of post vaccinal paralysis with symptoms of peripheral neuritis of the beriberi type is recorded. The vaccine administered was a 2 per cent emulsion of fixed virus sheep's brain in 0.5 per cent. carbol saline.

The sterility of cords utilized for the preparation of dried cord vaccines and of brains utilized for the preparation of phenol vaccines (Semple) has been studied by DODRISO²² at the Pasteur Institute of Hanoi. Of the former the percentage of contaminations during the hot weather was 18.3 and during the cold season 13.8. Of the latter the percentages of contaminations were 3.8 and 3.7 during hot and cold seasons respectively. Brain and cords were taken from the same animals. It appears that the brain is more resistant to contaminating infection than is the cord.

EDWARDS²³ puts forward evidence in favour of the view that treatment is unnecessary in the case of a person bitten by a dog which remains alive and well for 10 days after it inflicted the bite.

1. Rabies in Animals.

The problem of the spread and control of rabies in the South American cattle ranches is one of greater economic importance than may be realized. In a much condensed but very illuminating paper MOLINA²⁴ discusses the situation as it exists in the Matto Grosso. The following summarized Table shows the extent of the damage caused by the disease in the area served by the Pasteur Institute at Caceres (Matto Grosso).

Years	Cases of bovine rabies amongst		Total
	Unvaccinated	Vaccinated	
1934	5,700	193	5,893
1935	5,280	180	5,460
1936	2,430	345	2,775
1937	1,100	157	1,257
	14,510	877	15,387

The total number of cattle in the area in question is estimated at 115,000 so that the total incidence was about 1.09 per cent. in 1937. In certain ranches the incidence is greater for example in "Cachoeira."

²² DODRISO (J.). *Tax de souillure des moelles et des cerveaux rabiques*—B. H. Soc. Path. Exot. 1936 July 6 Vol. 31 No. 7 pp. 562-564.

²³ EDWARDS (W. P. S.). *Note on Anti-Rabie Inoculation of Dogs in India*—Jl Roy Army Vet Corps 1933 Aug Vol. 9 No. 4 p. 187.

²⁴ MOLINA (Amal). *Profilaxia da raiva pela vacinaçao*—Boi. Soc. Brasileira de Med. Vet. Rio de Janeiro, 1933, Mar & Apr Vol. 8 No. 2 pp. 103-106.

amongst 2 500 vaccinated cattle 70 died or 2.8 per cent. It will be remembered that in these localities the disease is spread by the vampire bat and that naturally the distribution of the disease corresponds with the distribution of that vector. An intensive campaign of vaccination has been carried out in connexion with the Pasteur Institute at Caceres during recent years and the results of that activity coupled no doubt with measures against the bat are indicated in the above Table which shows that the incidence of cases in 1937 is approximately one-fifth of what it was in 1934. It is not possible to achieve complete vaccination of a whole herd. This is particularly difficult in breeding establishments where it is estimated that about 20 per cent escape vaccination on account of wandering over the prairies. The vaccine employed consists of 1 part of brain substance in 9 parts of phenol glycerine. The dosage is from 20–40 cc and this is easily tolerated. Animals which have received three such doses one each year appear to have acquired a solid immunity. In highly infected ranches the effects of herd inoculation do not persist for more than six months. In lightly infected ranches on the other hand single inoculations lead to the disappearance of the epidemic. The dominant factor controlling the size of an epidemic is not so much the density of the bovine population as the prevalence of the vampire bat. During the summer months the vaccine should not be kept for more than 40 days after preparation. The general results are as follows. In ranches situated within an infected area but themselves still uninfected vaccination of the herd has been absolutely efficient. When used in infected ranches within the infected area the effect is still great but eradication of the disease cannot be achieved. As a solid immunity can only be attained after three successive inoculations—a procedure which may be impossible in prairie country—complete eradication of the epizootic by prophylactic vaccination alone cannot be expected.

In a long critical review of rabies treatment in general and of the methods of control of the canine epizootic PENNA²⁵ discusses the various points which relate particularly to Rio de Janeiro. He recommends that in the case of animal inoculation dead vaccines should be used (phenol vaccine Semple) but that in the case of human beings a living vaccine (dried cords) should be employed. He draws attention to the dangers which may arise from the use of living vaccines on animals. Cases of *rage de laboratoire* may occur with serious results.

Further statistics regarding the prophylactic vaccination of dogs at Tunis relating to the year 1937 are reported by BALOZET²⁶. Amongst 1,829 primary and 782 revaccinations of dogs no failure has been recorded. With regard to curative treatment of 44 horses one died and of 32 cattle three died of rabies.

vi. Post Vaccinal Paralysis

BEACH²⁷ reports a case of painful paralysis of the extremities after antirabic treatment and asks the editor of the *Journal of the American*

²⁵ PENNA (Oswino). O problema da raiva no Rio de Janeiro.—*Bol. do Secretário Geral de Saúde e Assistência*. Rio de Janeiro 1937. Dec. 31. Vol. 3. No. 6. pp. 13–31. French summary.

²⁶ BALOZET (Lucien). La vaccination antirabique des animaux en Tunisie du 1^{er} janvier au 31 décembre 1937.—*Arch. Inst. Pasteur de Tunis* 1938. Juin. Vol. 27. No. 2. pp. 241–244.

²⁷ BEACH (W. R.). Painful Paralysis after Antirabic Treatment. [Queries & Minor Notes].—*Jl. Amer. Med. Assoc.* 1933. May 28. Vol. 110. No. 22. p. 1857.

TRYPANOSOMIASIS

PRÉCIS OF ABSTRACTS IN THIS SECTION

LESTER (p 204) shows that in Northern Nigeria sleeping sickness is most prevalent in the central part of the country. It is usually of mild type but produces lowered resistance to other diseases. A rapidly fatal toxæmic form without any sign of involvement of the nervous system and the classical form also occur. Recently there has been a spread into areas previously little affected. Treatment is by germanin or antrypol and trypanamide.

HOARE (p 205) gives a detailed account of the size, shape and position of the kinetoplast in mammalian trypanosomes. This cannot be further abstracted. He concludes that JACONO's classification cannot be applied to mammalian trypanosomes and that the generic name *Castellanella* is inadmissible.

CORSON (p 208) reports that further cyclical transmission of a strain of *T. gambiense* which has now been studied in this way for four years, by *G. morsitans* in monkeys has not resulted in change of virulence or morphology. Direct transmission through monkeys, guinea-pigs and white rats, however has led to certain variations. As a result of maintaining a strain of *T. rhodesiense* in sheep by cyclical passage through *G. morsitans* for almost four years he (p 208) concludes that *T. rhodesiense* is a parasite not only of man, but also of wild and domestic animals in sleeping sickness areas and may retain its infectivity for man for several years at least. He recognizes differences between individuals in resistance to infection, and describes the local swellings caused in man by trypanosomes at the site of infection. Working with a strain of *T. rhodesiense* the same author (p 210) found that no change in virulence occurred as a result of prolonged passage through ruminants. Flies fed on a reedbuck infected with this strain frequently showed infected salivary glands, no such glands were found in flies fed on a similarly infected gazelle. He also (p 210) found that the cerebrospinal fluid of 22 of 27 monkeys infected with *T. rhodesiense* was infected. In one the duration of the disease was only 19 days, in the remainder it was from 1½ to 7 months. In man early diagnosis and treatment are of importance in view of the possibility of early cerebrospinal involvement.

VAN HOOFF *et al.* (p 211) found that drug resistance of *T. gambiense* to Bayer 205 is unstable, decreasing on mechanical passage and on cyclical passage through *G. palpalis*. LAUNOV and LAGODSKY (p 212) found that a trypanamide-resistant strain of *T. oxymurum* was less sensitive to antimony than the normal strain. LAUNOV (p 212) found that the natural chemo-resistance of *T. congolense* is not identical with the artificial chemo-resistance of *T. oxymurum* since the reaction of these in mice was not the same under treatment with certain drugs.

HALBERSTADTER (p 213) measured the dose of X rays necessary to cause loss of motility and infectivity in *T. gambiense*. JAIDOT (p 213) found that *T. equiperdum* and *S. recurrentis* remained alive after cooling to -260 °C.

CARPANO (p 214) recognizes that trypanosomes can be arranged in series from those essentially blood parasites (*T. evansi* and *T. vivax*) to the almost exclusively tissue parasites (the leishmanias).

GHIDINI (p 214) notes the distribution of *Glossina* in Italian East Africa.

TALIAFERRO (p 214) found that in *T duttoni* as in *T lewisi* infections a specific reproduction inhibiting antibody, ablastin and a specific trypanocidal antibody, both passively transferable are found in mouse serum. A group reaction between *T duttoni* and *T lewisi* and their ablastins occurs *in vitro*.

FRENCH (pp 215-216) discusses the changes in blood sodium potassium calcium chlorine and inorganic phosphorus in *T congolense* and *T brucei* infections.

FOURNIAIS (p 216) points out that signs of trypanosomiasis may only appear after the return of infected persons to Europe.

GUIBERT and BOSCH (p 216) emphasize the importance of bone marrow examination in diagnosis. It may be positive when blood and gland juice are negative. JOSPIN and GALLAIS (p 217) also describe a patient whose bone marrow was positive when other examinations were negative. THIROUX (p 217) emphasizes that the inoculation of monkeys with blood is a very delicate test.

BROWN and BROOM (p 217) studying the red cell adhesion test found that standard concentrations of red cells and trypanosomes are necessary to produce constant results and complement must be present. Certain human red cells will not adhere to sensitized trypanosomes. BROWN (p 218) found that in mice the electrical charge of polymorphic trypanosomes undergoes a reversal of sign if relapse occurs after spontaneous cure. The nature of the host apparently has a definite effect upon the sign of the change of trypanosomes. A simple test is described for determining the sign, positively charged trypanosomes becoming adherent to the red cells.

PARKIN (p 219) records instances of spontaneous recovery in animals infected with *T vivax* and *T congolense*.

MASSEGUET (p 220) has written a general account of treatment.

HAWKING (p 220) analyses the trypanocidal action of trivalent arsenicals and acriflavine. The reaction probably occurs in three stages: fixation of the drug, secondary chemical reaction and death of the trypanosome. KING, LOURIE and YORKE (p 221) obtained permanent cure in approximately 100 per cent of mice and rabbits infected with a laboratory strain of *T rhodesiense* by the use of *n*-undecane-1, 11-diamidine. This drug has also a definite action on human simple tertian malaria. Several aromatic amidine and guanidine compounds showed trypanocidal action *in vitro* and some produced cures in mice. LOURIE and YORKE (p 221) describe drug resistance in trypanosomes. Each of the four types of resistance is specific for its own group of chemical compounds. The four types are: (a) resistance to the aromatic compounds of arsenic and antimony and to acriflavine; (b) Superadded tartar emetic resistance; (c) Resistance to Bayer 205; (d) Resistance to the amidine and guanidine compounds.

VAN RENSBURG (p 222) found that surfen C caused serious local reactions in bovines on intramuscular injection and was ineffective against *T congolense* infection. BIOZZI (p 223) found that various oligodynamic solutions and colloidal preparations of metals possessed therapeutic properties.

BROWN (p 223) shows that in parts of Uganda an almost perfect equilibrium between *T gambiense* man and *G palpalis* has been reached. He discusses bush clearing and other means of control. Antypol in 1 gm. doses can protect clearing gangs for three months. NASH (p 224) considers that in Northern Nigeria (unlike East Africa) it would be inadvisable to practise densification of woodland by fire.

exclusion in *G. morrisians* belts. It could only be successful in the south where a cooler moister climate makes tsetse prefer open conditions.

TALICE and various others (p 225 *et seq*) describe early cases of Chagas disease in Uruguay. Oedema of the face, dacryoadenitis, cervical and other adenitis, thyroid enlargement, anaemia, leucocytosis with relative mononucleosis and slight splenic enlargement were among the features noted. "Sulfanil" was beneficial in one case. MAZZA *et al* (p 227) describes the pathological appearances found post mortem in a case of chronic Chagas disease. LONO *et al* (p 228) found the incidence of thyroid enlargement in certain parts of the Argentine to vary from 23.34 to 45 per cent. of those examined. This is interesting in view of the importance attributed to this condition in Chagas disease.

CARDOSO (p 228) showed that metacyclic forms of *T. cruzi* in faeces of *T. infestans* can pass through intact mucous membranes and scarified skin. Infection by bite occurred in one instance, possibly owing to regurgitation from the insect's intestine or contamination of the mouth parts. DIAS and TORREALBA (p 229) found crithidial and metacyclic forms of *T. cruzi* in the duodenum and rectum of *Eutritoma maculata*, a natural vector of infected *Triatoma* in Santiago province. (p 229) gives the percentages of infected *Triatoma* in one area. Forty-five per cent. were infected in one area.

TALICE (p 230) obtained a positive result with the xenodiagnostic test in a patient regarded as suffering from a reinfection. DIAS (p 230) reports that two patients who were in the chronic stage of Chagas disease in 1922 both gave positive xenodiagnostic tests with *Paratrypanosoma (Triatoma) marginatus*. MAZZA (p. 231) gives instructions for laboratory diagnosis, including the xenodiagnostic procedure.

TALICE (p 231) found cats to be naturally infected in Uruguay. COLBERTSON and KOLODY (p. 231) found complete immunity in rats which have recovered from *T. cruzi* infection. C II

LESTER (H. M. O.) The Progress of Sleeping Sickness Work in Northern Nigeria.—*West African Med J* 1938. Oct. Vol 10 No 1 pp 2-10 With 1 map

In a previous paper [this Bulletin 1933 Vol. 30 p 430] the author described the history of sleeping sickness in Northern Nigeria up to the end of 1931 and the train of events which led to the adoption of the French system of mass survey and treatment. At that time it was thought that the areas of epidemic sleeping sickness were quite circumscribed, but the first year's work of the survey system in 1931 showed that the position was much more serious than had been thought previously.

By the beginning of 1938 some 2,200,200 people had been examined and about 300,000 cases found and treated. Investigations into the incidence of the disease have now been made in every province in Northern Nigeria. The main epidemic belt is confined to the central part of the country viz Zaria Province, Niger Province, the Southern parts of Katsina and Kano Provinces, and parts of Benue and Plateau Provinces.

Taken as a whole the disease is of a mild type. Lester states that three types of the disease are met with —

(a) The commonest is a mild form which often constitutes more than 95 per cent. of the cases met with. After initial fever and headache the

patient reaches a stage where the disease and his resistance to it appear to have obtained a state of equilibrium. He suffers from periodic attacks of headache and fever and a certain amount of weakness. The cervical glands are enlarged, there are transient signs of toxæmia, such as puffiness of the face, swelling of the limbs, and occasional albuminuria. The patients are below par mentally and physically, and may remain in this state for years. They have a lowered resistance to other diseases so that the death rate among them is higher than it should be. It is this lowered resistance which is at the root of the very real depopulation which has occurred in some of the more heavily infected areas.

(b) In the second type which is much rarer toxæmia is the salient feature. Patients complain of headache, fever and weakness, oedema is common and a certain proportion become completely waterlogged. The progress of the disease is rapid, the patients dying without any sign of involvement of the central nervous system.

(c) In this type the disease behaves as it should do according to the text book description. Sooner or later the nervous system becomes involved extensively and the patient reaches the characteristic sleeping stage.

The proportion of cases in the three classes varies in different epidemics, but almost always the first type preponderates. In the more virulent epidemics the second and third types are relatively more numerous than in the milder ones.

Lester states that all the evidence available suggests that there has been a disconcerting spread of the disease into areas previously little affected. The disease has become epidemic recently in many places where it was previously endemic. There are three chief causes for this rise: (1) the change in the habits of the people consequent on pacification and settled rule, (2) the increase in transport facilities, (3) the employment of gangs of labour for railway constructions, mining and roadmaking.

Therapeutic measures—At first the disease was treated with trypanamide. The results were on the whole good, but ocular disturbance and arsenical dermatitis, although comparatively rare, gave a good deal of trouble.

References have already been made [this *Bulletin* 1934 Vol. 31 p. 570] to a very serious accident which occurred at one centre in 1932, many of the patients becoming violently ill after the first 2 gram dose, some of them dying of acute arsenical poisoning in from three to seven days and others becoming blind. It was later observed that toxic symptoms only occurred when boiled and filtered water was used instead of distilled water. The issue of portable stills to all sleeping sickness teams overcame this difficulty.

Towards the end of 1934 the present system of treatment with three 1 gram doses of germanin or antrypol followed by five 2 gram doses of trypanamide was introduced.

The rest of the report which must be studied in the original by those interested, consists of an account of the work of the sleeping sickness teams and a description of the present organization. *W. Yorke*

HOARE (Cecil A.) *Morphological and Taxonomic Studies on Mammalian Trypanosomes. V. The Diagnostic Value of the Kinetoplast.*—*Trans Roy Soc Trop Med & Hyg* 1938 Nov 26. Vol. 32. No. 3 pp. 333-342. With 12 figs. [11 refs.]

This paper is an attempt to bring together and to correlate the data concerning the features presented by the kinetoplast in various species

Differential Characters of the Kinetoplast in *Leishmania trypanosoma*

Characters of Kinetoplast

Group	Species	Size		Shape			Sub-central (%)	Sub-terminal (%)	Terminal (%)	Marginal (%)
		Diameter (μ)	Area (μ²)	Rounded		Total (%)				
				Circular (%)	Oval or elliptic (%)					
Leishman	<i>L. tropica</i>	1.0	0.8	15	85	—	—	100	—	—
	<i>L. donovani</i>	1.1	0.0	76	24	—	—	100	—	84
	<i>L. crassipes</i>	1.2	1.1	70	30	—	—	100	—	—
	<i>L. rogersi</i>	1.0	0.8	81	19	—	—	100	—	—
	<i>L. mexicana</i>	1.4	1.5	—	—	+	—	—	—	+
Trypanos	<i>T. cruzi</i>	1.1	0.9	30-52	48-70	—	—	24-69	31-76	16-28
	<i>T. simiae</i>	1.1	0.9	29-54	16-62	—	—	28-34	65-74	25-31
Congonema	<i>C. congonema</i>	0.7	0.4	20-45	10-40	—	—	—	7-11	78-89
	<i>C. simiae</i>	0.8	0.5	52	26	—	—	—	—	89
Bancroft	<i>B. bancrofti</i>	0.6	0.3	25	—	—	—	74	4	22
	<i>B. rhodesiense</i>	0.6	0.3	11	—	—	—	74	3	23
	<i>B. gambiense</i>	0.6	0.3	5	—	—	—	62	8	30
Euglenas	<i>E. rogersi</i>	0.7	0.4	17-40	7-12	—	—	—	1-9	27-47
	<i>E. equiperdum</i>	0.6	0.3	24	—	—	—	91-99	—	39

*Only two specimens of this species were available.

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of mammalian trypanosomes. The term kinetoplast is employed in its original sense to denote the kinetonucleus alone without the blepharoplast. The material forming the basis of the study consisted of blood films stained by one of the Romanowsky methods of 14 species of mammalian trypanosomes. The characters of the kinetoplast examined were its shape size and position in the body. The author summarizes his observations in the above Table.

The differential diagnosis of the various trypanosome groups and species on the basis of the characters of the kinetoplast (as shown in this Table) can be stated as follows —

I *Lewis* Group

Kinetoplast large (1.0 to 1.4 μ) shape rounded position subterminal or subcentral never terminal

(1) *T. lewisi* kinetoplast typically elliptic in outline position subterminal, far from posterior end of the body

(2) *T. theileri* kinetoplast typically circular in outline position subterminal far from posterior end of the body in all and marginal in majority

(3) *T. cruzi* kinetoplast very large typically irregularly circular in outline position subterminal near the posterior end of the body. Owing to its size and position it is in contact with both sides of the body

(4) *T. evansi* (from vole) kinetoplast typically circular in outline position subterminal in a few marginal

(5) *T. melophagium* (ovine) (available material too scanty for comparison included in the table as an illustration of trypanosome with large kinetoplast in subcentral position)

II *Lucas* Group

(6) *T. vivax* and (7) *T. uniforme* distinguished from the remaining three groups of pathogenic trypanosomes by the large size of the kinetoplast (1.1 μ) its shape is always rounded more or less regularly circular or elliptic in outline position terminal or subterminal, in a fair number also marginal

III *Congolense* Group

(8) *T. congolense* and (9) *T. simiae* kinetoplast of medium size (0.7 to 0.8 μ) (considerably smaller than in the *Lucas* group but slightly larger than in the *Brucei* group) shape may be rounded or rod-like position in great majority subterminal and marginal. When the arrangement is marginal the rhizoplast of the flagellum frequently starts from the posterior part of the kinetoplast and the latter if elongated usually lies more or less parallel to the long axis of the body (cf *Brucei* group)

IV *Brucei* Group

(10) *T. brucei* (11) *T. rhodesiensis* and (12) *T. gambiense* kinetoplast small (0.6 μ) usually rod-shaped position in the majority subterminal, and in a fair number marginal. In the latter case the kinetoplast, if elongated usually lies transversely to the long axis of the body while the rhizoplast in most cases starts from the anterior part of the kinetoplast. The last two features may help to distinguish the stumpy trypanosomes of this group from *T. congolense* (v. supra)

V *Evansi* Group

(13) *T. evansi* and (14) *T. equiperdum* as regards the kinetoplastic characters, the above members of this group do not differ in any respect from those of the *Brucei* group but *T. equinum* (not shown in the table) differs from all other trypanosomes in the absence of the kinetoplast.

CORSON (J F) Observations on the Pathogenicity for White Rats of a Strain of *Trypanosoma rhodesiense*—*Trans Roy Soc Trop Med & Hyg* 1938 Nov. 26. Vol. 32. No 3 pp 343-345

A strain of *T. rhodesiense* was obtained in October 1934 by feeding laboratory-bred *Glossina morsitans* on an untreated patient infected in Kahama. The strain was transmitted through sheep by means of *G. morsitans* 24 passages having been made up to May 1938. At the 13th passage in October 1938 a branch line through antelopes was begun. Infective flies were isolated by feeding them singly on white rats and were used to infect man and various animals, including white rats. Inoculations of white rats were also made from time to time from infected animals and man. In all 177 white rats were infected by inoculation from 58 vertebrate hosts consisting of 17 men, 27 sheep, 9 monkeys and 5 antelopes and 197 rats were bitten and infected by 80 isolated infective *G. morsitans* which had become infected by feeding on 19 vertebrate hosts consisting of 1 man, 9 sheep and 9 antelopes. The blood of the rats was examined, but the virulence of the strain was estimated from the life of the rats and, to a less degree, by the incubation period.

The following are the conclusions—

White rats were used as test animals in an experiment to see whether a strain of *T. rhodesiense* would lose its infectivity to man or undergo other changes in its characters during maintenance in mammal animals. The rats were infected by the bites of isolated *G. morsitans* and also by inoculation from the infected animals and volunteers. No change in virulence was observed.

The infections in rats produced by inoculation and by the bites of flies which had fed on the same hosts were similar but those produced by the flies appeared to be rather more acute.

The infections of a reedbuck and a Thomson's gazelle were apparently similar as tested in white rats but when *G. morsitans* were fed on these animals those which fed on the reedbuck showed a large proportion with infected salivary glands, while no fly with infected salivary glands was found among those which fed on the gazelle. [V]

CORSON (J F) The Cerebrospinal Fluid of Monkeys (*Cercopithecus* sp.) Infected with a Strain of *Trypanosoma rhodesiense*—*Ann. Trop Med & Parasit* 1938 Aug. 2 Vol. 32 No 2 pp 197-199

Reference is made to the fact that PERUZZI (1928) [see also this Bulletin 1928 Vol. 25 p. 771] found trypanosomes in the cerebrospinal fluid of three monkeys (*Cercopithecus* sp.) between the 28th and 31st day of infection with *T. rhodesiense*.

During the year March 1937 to March 1938 monkeys of the same species as those used by Peruzzi were infected at Tinde with a strain of *T. rhodesiense* which was being maintained in various antelopes by means of cyclical transmission by *Glossina morsitans*. The monkeys were infected by flies fed on antelopes. As it was at first intended to note the duration of life of the monkeys observations to find the dates of infection of the cerebrospinal fluid were not made but the cerebrospinal fluid was examined in some of the monkeys and the trypanosomes and leucocytes were counted. The duration of the disease was reckoned from the day on which trypanosomes were found in the monkey's blood as the exact date of infection was unknown but the incubation period of the strain in question in these monkeys was usually 4 to 7 days.

The results of the examination of the cerebrospinal fluid of 27 such monkeys are given in a Table. In all but two of the animals the duration of the disease was between 2 and 7 months. In the remaining two it was 19 days and 1½ months respectively. In 19 of the 27 animals trypanosomes were found sometimes in large numbers by direct examination and in 3 of the 8 negative cases their presence was demonstrated by inoculation of the cerebrospinal fluid into rats. The leucocyte count was greatly increased in all but one of the 27 monkeys.

It is interesting to note that the animal in which the duration of the disease was only 19 days contained trypanosomes in the cerebrospinal fluid and that subinoculated rats became infected and the leucocyte count was 211 per cmm.

The author compares these results with some observations that have been made on man particularly those of KEEVILL [this *Bulletin* 1928 Vol 25 p 795] and of MACLEAN and FAIRBAIRN [this *Bulletin* 1933 Vol 30 p 108]. The general conclusion is that the cerebrospinal fluid may contain trypanosomes very soon after a person becomes infected and that consequently very early diagnosis and treatment are of importance.

II 1

VAN HOOFF (L.) HENRARD (C.) & PEEL (E.) The Stability of Bayer 205 Resistance in *Trypanosoma gambiense*—*Trans Roy Soc Trop Med & Hyg* 1938 Aug 23 Vol 32 No 2 pp 197-208.

The authors have investigated the stability of Bayer 205 resistance in *T. gambiense*. MURGATROYD and YORKE [this *Bulletin* 1937 Vol 34 p 532] working with *T. rhodesiense* and *T. brucei* have shown that Bayer resistance is very slow to develop and that the *rhodesiense* strain lost its Bayer-resistance after repeated mechanical transmission through mice but that the *brucei* strain kept its resistance unaltered after one cyclical passage through *G. morsitans*.

The work of van Hoof, Henrard and Peel with *T. gambiense* generally confirms that of Murgatroyd and the reviewer except that van Hoof and his colleagues observe a definite loss of Bayer resistance after a cyclical transmission through the tsetse fly.

The following summary is given—

It has been shown how *Trypanosoma gambiense* either a susceptible strain or an arsenic-resistant one may be rendered resistant to Bayer 205. The experience acquired while treating numerous patients has proved that from time to time trypanosomes are found which are naturally resistant to 0.01 gramme but hardly ever to 0.02 gramme per kg. No strain has yet been isolated that did not respond to 0.10 gramme per kg. It must be concluded, therefore, that the Gemena strain had undergone true modifications.

MURGATROYD and YORKE (1937) have been able to prove that successive mechanical passages reduce drug resistance till it completely disappears. Their investigations extended over a period of 4 years during which a considerable number of passages through mice were made. The observations conducted at the Laboratory of Leopoldville were discontinued as soon as it was noted that passage through guinea-pigs was bringing about a decrease in Bayer resistance and the conclusions of these authors had been confirmed. It was further established that transmission through a different host, such as the monkey considerably accelerates the loss of Bayer-resistance.

From the practical point of view of prophylaxis of sleeping-sickness caused by *Trypanosoma gambiense* this loss of resistance is of much less

with the trypanosomes and spirochaetes thus cooled became infected. It follows therefore that the parasites had survived a fall in temperature (from the body temperature) of over 300°C. [17]

CARPANO (Matteo) Sulla morfologia dei tripanosomidi in rapporto all'ambiente [Morphology of Trypanosomes in Relation to Environment].—*Riv di Parassit* Rome 1938. May Vol. 2 No. 2 pp 81-90 With 1 plate [11 refs] English summary (10 lines)

Having encountered various cultural forms of *Trypanosoma theileri* in haemorrhagic lesions of the brain of an ox and later in a similar lesion of a lymphatic gland of another ox, the author reflects that, as regards the tendency to invade the blood stream or tissues, trypanosomes can be arranged in series from those forms which are essentially blood parasites (*T. cruzi* and *T. evansi*) to the leishmanias which are almost exclusively tissue parasites. C M Wernon

GHIDINI (Gian Maria) Le glossine dell'Africa Orientale Italiana. [The Tsetse Flies of Italian East Africa].—*Riv di Biol Colon*. 1938 Feb Vol. 1 No. 1 pp. 53-71 With 6 figs [15 refs] English summary (5 lines)

The paper extends our limited knowledge of the distribution of *Glossina* in Abyssinia and Italian Somaliland.

Among the new records published perhaps that of *G. morsitans* on the R. Didezza (a tributary of the Blue Nile, about 9°N) is the most interesting. Recent work has added to our knowledge of *Glossina* in Italian Somaliland particularly in the valley of the R. Juba. There is no extension of the range of *G. palpalis* since it was collected by BRUNET in the valley of the R. Omo which flows into the north end of Lake Rudolph. Other species recorded are *G. longipennis brevipalpis austeni* and *pallidipes*.

Much of the country is arid, and it seems that the tsetse flies are extremely localized, at least in most areas. The highlands of Abyssinia are (presumably) free of *Glossina* but the upper limit of altitude is not yet known. The paper gives no information on one most curious riddle. *G. tachinoides* is a West African species its eastern limit being on the Shari River about 18°E. But it also occurs in Southern Arabia in the hills behind Aden the gap in its range being about 27° say 1600 miles. The present paper contains no record of *tachinoides* (which one might expect to be found in some part of the area under review). The old record of *morsitans* from Massawa is quite rightly discredited. One is probably correct in thinking that the Red Sea littoral (British and Italian) is too dry for any species of *Glossina*.

The paper includes some indefinite remarks, but no facts about human and animal trypanosomiasis. The author provides a key to local species and figures of certain diagnostic points. P A Buxton

TALIAFERRO (William H.) Ablastic and Trypanocidal Antibodies against *Trypanosoma duttoni*.—*Jl Immunology* 1938 Oct. Vol. 35 No. 4 pp 303-323. [27 refs]

The non-pathogenic trypanosomes of rodents present a number of immunological problems of peculiar interest. These infections are

characterized by an initial period of rapid reproduction of the parasites followed by a period during which reproduction is either completely inhibited or greatly reduced and they are generally terminated by self-cure with a subsequent immunity of variable length.

In previous work [this *Bulletin* 1933 Vol. 30 p. 122] the author has shown that this peculiar development in *T. lewisi* is associated with the formation of two antibodies. The inhibition of reproduction is associated with a passively transferable antibody termed ablastin which has the specific property of inhibiting reproduction of the organisms—it possesses many of the classical features of ordinary antibodies but it exhibits no marked *in vitro* affinity for the organisms. The termination of the infection is associated with a trypanocidal antibody which shows all the classical characteristics of antibodies in general. As the reproduction-inhibiting antibody has been demonstrated serologically only in infections with *T. lewisi*, Tahaferro considered it to be of interest to ascertain whether it is present in an infection with another trypanosome. The matter has been studied in the case of *T. duttoni* of the mouse and the *duttoni* and *lewisi* antibodies are compared by various homologous and heterologous tests. The technique and results of the experiments are described in detail. The following are the conclusions—

1. The inhibition of reproduction of *T. duttoni* after 10 to 12 days in the mouse is brought about by a specific ablastin found in immune mouse-serum which is similar to that described in *T. lewisi* infections in the rat, and is passively transferable.

2. The eventual self-cure (to the extent that no trypanosomes are found in the peripheral blood) is associated with a specific trypanocidal antibody which is passively transferable and behaves as a typical trypanolysin.

3. A group-reaction can be demonstrated between *T. duttoni* and *T. lewisi* and their ablastins *in vivo* and between *T. lewisi* and the anti-*duttoni* trypanocidal antibody *in vivo* and somewhat weakly *in vitro*. Whether the reaction of anti-*lewisi* trypanocidal antibody against *T. duttoni* *in vivo* and *in vitro* is a true group-reaction of an immune anti-*lewisi* antibody is not evident because normal rat-serum is also trypanocidal against *T. duttoni*.

IV Y

FRENCH (M. H.) Studies in Animal Trypanosomiasis. IV. The Effect of *Trypanosoma congolense* and *Trypanosoma brucei* on Some Inorganic Blood Constituents.—*Jl Comp Path & Therap* 1938. June Vol. 51 Pt. 2. pp. 119-127 [18 refs.]

In a previous paper [this *Bulletin* 1938 Vol. 35 p. 712] the author has shown that *T. congolense* and *T. brucei* infections of cattle and sheep cause a loss of body tissues and an increased rate of excretion of body bases, chlorides and phosphates.

The present paper summarizes the changes in the blood sodium, potassium, calcium, chlorine and inorganic phosphorus caused by *T. congolense* and *T. brucei* infections in cattle, sheep and donkeys.

The author summarizes his conclusions as follows—

1. The inorganic phosphorus content of the blood was unchanged by trypanosome infections in cattle, sheep and donkeys.

2. The blood calcium was unaltered in several cases of trypanosome infections but showed a tendency to decrease in other cases. Interpretation of the calcium changes is therefore difficult.

and human red blood corpuscles. If the serum is homologous, the red cells become firmly adherent to the trypanosomes.

The authors state that when they were using this test for the study of the serology of strains of *T. brucei* which had been transmitted cyclically through tsetse flies, they obtained irregular and unrepeatable results from time to time. The present investigation was consequently undertaken in order to obtain some light on the explanation of these irregular results. The following conclusions were reached —

1. We have shown that standard concentrations both of red cells and of trypanosomes are necessary in order to obtain constant results in the Red Cell Adhesion test.

2. The character of adhesion obtained can be varied at will by altering the relative proportions of the various reagents or the time of incubation.

3. Agglomeration and lysis of trypanosomes take place, in presence of homologous serum, when other conditions necessary for adhesion are not present, e.g. an unsuitable indicator (red cells or bacteria).

4. The necessity for the presence of complement in this test has been confirmed and it is shown that the absence of any single component of complement inhibits the reaction.

5. The end titre of an immune serum has shown only slight variations when repeatedly examined by the adhesion test.

6. Certain human red cells will not adhere to sensitized trypanosomes.

7. This condition is met with both in pathological conditions and in normal individuals. We have been unable to correlate it with any altered physical state of the red cell.

8. In the same way certain bacteria adhere to sensitized trypanosomes and others fail to do so. This is not correlated with rough and smooth states of the culture."

1575

BROWN (H. C.) Some Observations on the Electric Charges of Micro-organisms.—Reprinted from *Scans JI Roy College of Science* 1933. Vol 8 pp 52-57 With 3 figs

The object of this address was to give a general idea of the subject and to discuss some of its simpler applications.

When particles are suspended in a fluid through which an electric current is passed, they will travel either to the positive or negative pole according to the sign of the charge which they carry. Moreover their rate of migration will be directly proportional to the magnitude of the charge. The phenomenon can be studied by making use of a microcataphoresis cell, which is described and figured.

Various observers have from time to time attempted to determine the size of the charge carried by trypanosomes when suspended in different fluids. The results have been extremely contradictory, some of the observers stating that the flagellates carry a negative charge whilst others assert that they are positively charged. According to Brown, the technique used by these observers is open to criticism. In his own experiments he has employed a medium of pH 7.2 consisting of one volume of physiological saline and nine volumes of 4 per cent. glucose in freshly boiled distilled water. In such a medium the following results were obtained —

Charge of the Insect Forms—The developmental stages of the sheep trypanosome *T. melophagium* in its insect vector *Melophagus ovinus* proved to be negatively charged.

Charge of the Cultural Forms—Cultural forms of *T. lewisi* and *T. cruzi* were always found to be negatively charged.

Charge of the Blood Forms—In the earlier experiments which were made on the charge of the various species of trypanosomes in mice rats and guinea pigs it was found that some strains were positive some negative and that others showed both positive and negative individuals in the same animal. It was not until the same animals were examined day after day that the explanation of these earlier findings was understood.

In the case of the polymorphic trypanosomes it was found that when a relapse occurs after a spontaneous cure in mice a reversal of the sign of the charge of the trypanosome invariably takes place.

The nature of the host has apparently a definite effect upon the sign of the charge of the trypanosome. If negatively charged trypanosomes from a mouse are injected into a more resistant animal such as a guinea pig or rat it is found that as soon as the infection in this animal is manifest the trypanosome will almost invariably have changed its charge whereas when the trypanosome is passed from mouse to mouse the charge remains constant.

With the object of overcoming certain technical difficulties due to the use of the cataphoresis cell, Brown has advised a simple test for finding the sign of the charge of the trypanosomes. The test consists in adding 0.02 cc. of infected blood to 0.3 cc. of a solution consisting of one volume of normal saline and nine volumes of 4 per cent glucose. After being allowed to stand at room temperature for a few minutes the suspension is examined under the microscope with a 1/4 inch objective. When the trypanosomes are positively charged they will be seen to be firmly adherent to the red cells either singly or in groups whereas negatively charged trypanosomes are perfectly free and non-adherent.

Certain experiments were conducted with *T. evansi* which showed very distinct differences in the susceptibility of the positively and negatively charged variants to the action of arsenical drugs. It was found that the positively charged variant is distinctly more susceptible to the action of the negatively charged ion of trypanamide. Brown adds that so far he has been unable to obtain similar results with other species of trypanosomes. W. Y.

PARKIN (B. S.) Auto-Sterilization in Trypanosomiasis.—*Onderstepoort J. Vet. Sci. & Animal Industry* 1938. Jan. Vol. 10 No. 1 pp. 21-27.

In the course of experiments on the chemotherapy of infections due to *T. congolense* and *T. vivax* it was observed that infected animals some considerable time after treatment or even without treatment made spontaneous recoveries. The purpose of the present article is to record various instances of spontaneous recovery observed by the author. Details are given in tables.

A number of cases of sterilization was noted in *T. vivax* infections of bovines and in *T. congolense* infections of bovines and ovines but no such cases were observed in *T. brucei* or *T. equiperdum* infections of equines. H. J.

MASSEGUIN. Quelques règles de traitement à propos de la maladie du sommeil [Rules for the Treatment of Sleeping Sickness].—*Marseille Méd* 1938. Sept. 5-15 Vol. 75 No 25-26 pp 253-260

A general account of the treatment of sleeping sickness, apparently written for the guidance of physicians in France. It contains nothing new and requires no notice here. W. J.

HAWKING (Frank) Analysis of the Trypanocidal Action of Trivalent Arsenicals and Acriflavine.—*Ann Trop Med & Parasit.* 1938. Oct 12 Vol. 32 No 3 pp. 313-331 With 6 figs. [14 refs.]

It has been shown by the reviewer and his colleagues and also by JANCsó and others, that normal trypanosomes readily absorb trivalent arsenicals when exposed to dilute solutions of these compounds. atoxyl-fast trypanosomes absorb them much less readily and it is now considered that this explains the phenomenon of drug-resistance.

In the present paper which is of a technical nature and must be consulted in the original by those interested, Hawking attempts to analyse the combination between drug and trypanosome in greater detail and to investigate its relation to the eventual death of the parasite.

The following summary is given —

"1 Time-action curves for the trypanocidal action of trivalent arsenicals and acriflavine show that there is a constant death-rate following an initial lag which is much longer than the time required for fixation of the compound.

"2 Time-concentration curves show that the trypanocidal action follows the equation $(C-C_0)e^{-kt}=k$, where n is 0.5-0.8 except in the case of phenylarsenoxide (1.04)

"3 From analogy with other pharmacological processes, it is probable that the reaction between drug and trypanosome occurs in three stages, viz., fixation of the drug, secondary chemical reactions, and eventual death of the organism. The fixation occurs rapidly being complete in a few minutes, and is reversible. The earlier part of the secondary chemical reactions is also reversible. The temperature coefficient (Q_{10}) of the whole trypanocidal process is 1.8

"4 When equilibrium has been reached between drug inside and outside the trypanosome, the partition-ratio (i.e., concentration inside trypanosome/concentration outside trypanosome) of reduced trypanamide is about 5,000 for normal trypanosomes and 5 for resistant ones. for phenylarsenoxide it is about 10,000 for arsenophenylglycine about 30, for sodium arsenite 30-100 and for tartar emetic about 200

5. The relation between the concentrations of acriflavine inside and outside normal trypanosomes respectively approximates to Langmuir's equation for adsorption, viz., $kx = \frac{Y}{B-y}$. With low concentrations this gives a constant ratio (partition-ratio) between the internal and external concentrations respectively viz. 8,000. When normal trypanosomes are saturated with acriflavine they contain drug equivalent to 3 per cent. of their own (moist) weight.

6. The absorption of acriflavine by resistant trypanosomes shows a similar relationship with the lower concentrations, but the partition-ratio is only 60. With higher concentrations the relationship is distorted by the fact that the death of resistant trypanosomes is accompanied by an increase in their powers of absorption.

"7 The amount of reduced trypanamide required to kill a normal trypanosome in three hours is about $8 \times 10^{-9} \gamma$ which is sufficient to form

a monomolecular film over only 5 per cent. of its surface. The corresponding amount of acriflavine is $9 \times 10^{-2}\gamma$ which is sufficient to cover the whole surface

W Y

KING (H.) LOURIE (E. M.) & YORKE (Warrington) Studies in Chemotherapy XIX. Further Report on New Trypanocidal Substances. — *Ann Trop Med & Parasit* 1938 Aug 2. Vol 32. No 2. pp 177-192

This communication amplifies the earlier results obtained by the authors in their examination of a considerable number of guanidines isothioureas amidines and amines with alkyl and alkylene chains

The following summary is given —

1 The investigation described in this paper was instigated by the discovery that synthalin has a powerful direct trypanocidal action

2 A considerable number of guanidines, isothioureas amidines and amines with alkyl and alkylene chains were prepared and examined for trypanocidal activity

3 It was found that certain of the diamidines exhibit a powerful trypanocidal action *in vitro* and that with the most active member of the series, viz. n. undecane-1 11-diamidine it is possible to produce permanent cures in approximately 100 per cent. of mice and rabbits infected with our laboratory strain of *T. rhodesiense*

4 Undecane diamidine had little curative action on mice infected with *T. congolense* but when given in large doses on the day of inoculation and on the following nine days it exhibited a pronounced prophylactic action.

5 This compound had no action on *T. cruzi* infections in mice or on mice infected with *Spirochaeta recurrentis* or *Spirillum minus*

6 It has a definite action on human simple tertian malaria, causing the parasites to disappear from the peripheral blood and the febrile paroxysms to cease.

7 The structural feature common to all the compounds referred to above is the possession of a central inert carbon chain with terminal polar groups of strongly basic nature

8 As it seemed possible that this carbon chain merely served as a carrier of the active groupings and might be replaced by an inert aromatic structure of approximately the same molecular weight, a number of aromatic amidine and guanidine compounds were prepared

9 Several of these aromatic compounds were found to exhibit pronounced trypanocidal action *in vitro* and with three of them, viz. pp-diguanidino-diphenyl methane pp-diamidino-diphenyl methane and 2 7 naphthalene diamidine it was found possible to cure mice infected with *T. rhodesiense*

10 This work opens up a new field in the search for substances of therapeutic value against trypanosomal and malarial infections.

[See also this *Bulletin* 1938 Vol. 35 p 638]

W Y

LOURIE (E. M.) & YORKE (Warrington) Studies in Chemotherapy XX. The Preparation of Strains of Trypanosomes resistant to Synthalin and Undecane Diamidine and an Analysis of their Characters. — *Ann Trop Med & Parasit* 1938 Aug 2. Vol. 32. No 2. pp 201-213

In this paper the authors describe the preparation of strains of trypanosomes resistant to synthalin and undecane diamidine. The

characters of these strains are compared with those of strains of the same trypanosome previously made resistant to the aromatic arsenical and antimonial compounds to tartar emetic acriflavine and to Bayer 205 respectively

The following summary is given —

" 1 The preparation of strains of *T. rhodesiense* resistant to synthalin and to n undecane-1 11-diamidine respectively is described in detail.

2 The development of synthalin- and undecane diamidine resistance is a slow process as compared with the development of resistance to the aromatic compounds of arsenic or antimony or to acriflavine

3 The characters of these two strains were examined and compared with those of strains of the same trypanosome which had been made resistant to trypanamide and to Bayer 205 respectively

4 It was found that the synthalin and undecane diamidine-resistant strains are indistinguishable from one another in that they are both resistant to each of these drugs and to pp'-diguanidino-diphenylmethane and naphthalene-2 "-diamidine Both these strains are however as sensitive to Bayer 205 and to halarsol as is the normal parent strain and, conversely the Bayer 205- and trypanamide-resistant strains are just as sensitive to undecane diamidine as is the normal parent strain

" 5 The characters of the four different types of resistance to therapeutic substances which we have developed in *T. rhodesiense* are discussed These types of resistance are

" (a) Resistance to the aromatic compounds of arsenic and antimony and to acriflavine

(b) Superadded tartar emetic resistance

(c) Resistance to Bayer 205

(d) Resistance to the amidine and guanidine compounds

Each of these types of resistance is specific for its own group of chemical compounds.

IT 1

VAN RENSBURG (S. W. J.) Surfen C. Therapy in *Trypanosoma congolense* Infection in Bovines and Ovines.—*Onderstepoort Jl. 1 et Sci & Animal Industry*, 1938 Jan Vol. 10, No. 1 pp. 13-20

Prior to the advent of antimosan the only drug of any value for the treatment of *T. congolense* infections of cattle and sheep was tartar emetic. Owing to its ease of administration antimosan is immeasurably superior to tartar emetic, and PARKIN in 1930 concluded that bovines infected with *T. congolense* could be sterilized by the subcutaneous injections of 3 gm. of antimosan given at four weekly intervals

When Surfen C appeared a claim was made that a single dose of about 10 mgm. per kilo of body weight, given either intramuscularly or subcutaneously proved a certain sterilizing dose in animals infected with *T. congolense*. The author writes that Surfen C has now been subjected to tests in various parts of Africa but the reports regarding its efficacy and local tolerability are conflicting

A summary is given of the more important results hitherto obtained. This is followed by a description of the author's experiments on cattle and sheep artificially infected with various strains of *T. congolense*

The general conclusions reached are that the intramuscular injections of Surfen C into bovines caused serious local reaction, and that the treatment of bovines and ovines infected with *T. congolense* by Surfen C was ineffective.

IT 1

Biozzi (Silvio) Azione delle acque oligodinamiche e di alcuni preparati di metalli colloidali sulla infezione sperimentale da *Castellanella brucei* [Action of Oligodynamic Waters and of Certain Preparations of Colloidal Metals on Experimental *Trypanosoma brucei* Infections.]—*Riv di Parassit* Rome 1938 May Vol. 2. No 2 pp 95-110 With 4 figs on 1 plate [17 refs.] English summary (5 lines)

Testing oligodynamic watery solutions of zinc silver and copper and two colloidal preparations (zinccuprol and cupridol) on *Trypanosoma brucei* infections in guinea-pigs the author finds that they possess distinct therapeutic properties. The four illustrations showing infected blood before and after treatment have been all incorrectly labelled.
C M Wenyon

BROWN (Arthur A Forbes) Trypanosomiasis Gambiensi. Some Observations in Uganda and their Bearing on Prophylaxis.—*Jl Trop Med & Hyg* 1938 June 15 July 1 & 15 Aug 1 & 15 Sept. 1 & 15 Vol. 41 Nos. 12 13 14 15 16 17 & 18 pp 200-207 220-222 234-237 247-251 265-270 281-286 296-301 With 12 figs (1 map) [47 refs.]

As the author writes in the introductory remarks which precede this long series of articles they cannot be held to contain anything new and whatever is advocated in them has already been stressed by others. One of the author's reasons for bringing up certain methods of prophylaxis is that close co-operation between the medical man and the local administration is an absolute essential.

In the West Nile the focus of sleeping sickness at Aringa has been a problem for years and the cause of much dispute between the Medical Officer and the Administrator. Out of the turmoil a combined scheme for dealing with the situation was eventually decided upon.

The author summarizes his conclusions in the following terms —
(1) In the West Nile, an equilibrium has now reached a stage nearing perfection between *T. gambiense* man, and *G. palpalis*. This allows the trypanosome a placid existence in its human host, and in *G. palpalis* polymorphic trypanosomes develop cyclically to give a salivary-gland infection of not less than 0.6 per cent. The balance is not yet perfect because (a) the disease though mild, is still fatal (b) salivary-gland infections are attenuated.

(2) Owing to the suitability of man nowadays to an adapted trypanosome symptomless human reservoirs are numerous and owing to the complexity of rivers, widespread infection is inevitable i.e., the degree of balance attained is actually more troublesome than if it did not exist.

(3) The fly population of all rivers is small abrupt variations in water volume by destroying pupae will never allow it to increase. *G. palpalis* is forced to live precariously conditions are so unfavourable that it seldom can leave the river beds, and it is not sufficiently hardy to survive other than by a small margin. Narrow strip debushing thus can alter conditions so as to prevent its further existence.

(4) Administrative measures must aim at (a) Quarterly inspection of the population (b) Continuation of examination by suitably placed microscope posts. (c) Modified resettlement of population. This must not exceed its scope which at best, is limited by the complexity of rivers and scarcity of good soil.

(5) Debushing is absolutely essential, and reduces fly to 10 per cent boy-day and probably less. This can be attained by width of 10 yards each side on small streams and not more than 25 yards each side in the case of main Nile tributaries.

(6) It is the length of clearing which impedes *G. palpalis* which does not readily undertake more than 1 000 yards of strip-clearing. The ideal road and crossing clearing is 2,000 yards by 10 yards each side. The minimum is 1 000 yards by 10 yards each side. Settlement clearings must project beyond the last homestead for not less than 500 yards, and, better 1 000 yards.

(7) Hand-catching can reduce fly probably to 10 per boy-day. The ill-effects of clearing on agricultural activities can be mitigated by a scheme of alternate strip clearings 1 mile in length, isolating bushy strips of equal length, in which catching and trapping can be done. Erosion is best prevented, and clearings maintained, by controlled grazing, which promotes rotation of grasses and establishes creeping varieties.

(8) Debushing must always commence with the headwaters, and progress downwards. By doing so in the wrong direction there is great danger of fly being driven into a mass of tributaries, to spread infection.

(9) Livestock act as a biological barrier. Instead of removing livestock from rivers for fear of attracting tsetse they should be introduced deliberately.

(10) Antrypol, as a 1-grm dose, can protect clearing gangs for three months. It is also of value in preventing extension of epidemics."

W J

NASH (T. A. M.) The Probable Effect of Densification of Woodland upon the Distribution of Tsetse in Northern Nigeria.—*West African Med J* 1938. Oct. Vol. 10 No 1 pp. 10-13

It has been found that in East Africa the exclusion of fire in certain vegetation communities results after a few years in a striking thickening of the vegetation, and that this densification is accompanied by a steady decrease in the *G. swynnertoni* population.

Judging from the East African reports it might naturally be assumed that a policy of densification of woodland would be an excellent anti-tsetse measure to employ in Nigeria, but most unfortunately this is not the case as owing to the much severer climatic conditions experienced in Northern Nigeria densification of woodland is precisely what tsetse need in order that they may extend their range.

Nash compares the habitats of *G. morsitans* in East and West Africa, and the reasons for the differences which occur in these two countries. He also discusses the habitats of *G. tachinoides* and *G. palpalis* in Northern Nigeria. As the result of his reflections he reaches the following conclusions—

"1. A large scale policy of densification of woodland by fire exclusion would be beneficial to tsetse in the Northern parts of Nigeria, enabling all the three common species to extend their range owing to the greater protection against adverse climate conditions afforded by thicker vegetation.

"2. It would be most inadvisable to practise fire exclusion in *G. morsitans* belts.

"3. Wherever possible forestry reserves in which fire exclusion is practised should be sited in uninhabited areas where *G. morsitans* does not occur.

"4. In the vicinity of towns it is advisable that all streams within forestry reserves should be cleared and that no attempts be made to exclude fire. In this manner areas of woodland can be safely protected from exploitation, without unnatural densification and the consequent risk of becoming tsetse sanctuaries.

"5. In the vicinity of towns all fuel plantations should be sited in areas lying *in between* streams. If possible the edge of the plantation should not approach within quarter of a mile of a stream.

8 Densification of vegetation could only succeed as an anti tsetse measure in the southern parts of Nigeria where a cooler moister climate makes tsetse prefer more open conditions, whilst the high rainfall tends to produce excessively dense vegetation.

Attention has been drawn by forestry officers and others to the very real danger to Nigeria of the deforestation which is taking place in many parts. The conservation of moisture by the soil is enormously reduced by the destruction of forest and serious erosion is likely to take place when the natural covering of woodland is destroyed. It is the aim of the Nigerian Forestry Department that approximately 25 per cent of each district should be under woodland.

Nash hopes that the present paper will help to clarify the issue between foresters and those engaged in sleeping sickness control by explaining the relationship which exists between tsetse climate and vegetation and further that it will be realized that there are no real obstacles between the policy of conservation of woodland and tsetse control providing that due care is taken in the siting of forestry reserves and fuel plantations.

IV Y

TALICE (R. V.) & TERRA NÚÑEZ (G.) Tercer caso uruguayo de enfermedad de Chagas. (Forma aguda.) [Third Case of Acute Chagas' Disease in Uruguay].—*Arch. Uruguayos de Med. Cirug. y Especialidades* 1938, Mar Vol. 12 No 3 pp 241-248 [15 refs.]

Talice and his co-workers continue to record cases of Chagas disease in Uruguay [see this *Bulletin* 1938 Vol. 35 pp 351-352]. The patient in this instance was a man of 20 years. He woke up one morning feeling a hot itching sensation of the right eyebrow and three red spots were seen. The following day each of the three small lesions was covered by a scab and two days later there was oedema at first of the brow but later spreading to involve the eyelids cheek and adjacent part of the neck. By this time the sixth day from the onset he consulted a doctor. Palpable glands were felt in the neck temperature was 38°C and there was marked prostration with intense headache. *T. cruzi* was found in the blood. Improvement was very rapid and the patient was discharged from hospital four days after admission. He came from a rural part of the Department of Tacuarembó and this is said to be the first case recorded from this part of the country.

H. H. S.

TALICE (R. V.) RIAL (Benito) & DE MEDINA (Federico) Forma aguda de enfermedad de Chagas (6° caso uruguayo) acompañada de hipertrofia de la glándula tiroidea. [A Case of Chagas Disease accompanied by Enlargement of the Thyroid Gland.].—*Arch. Uruguayos de Med. Cirug. y Especialidades* 1938, May Vol. 12, No 5 pp 497-510 With 7 figs. on 2 plates & 1 chart. [18 refs.]

This is the sixth case to be recorded by the authors in Uruguay this time it was a boy of two years and the case also was one running an acute but on the whole a mild course. The chief reason for calling attention to it is that during the illness the thyroid enlarged. The child's mother was very definite in her statement that there had been no such enlargement prior to the present illness nor did either of the parents or any relatives suffer with a goitre. The enlargement

began to show itself at the end of the first week of illness and progressed for about a month then became smaller but was still observable three months afterwards. The authors are convinced that there was an "acute congestive thyroiditis of trypanosomal origin." There were none of the usual signs of disturbance associated with ordinary goitre

H H S

TALICE (R. V.) REGULES (Uruguay) & ALAMBARRI (Alfredo) Los dos primeros casos de enfermedad de Chagas comprobados en la ciudad de Mercedes. [Two Cases of Chagas Disease, the First to be recorded in Mercedes.]-*Arch. Uruguayos de Med. Ciruj. y Especialidades* 1938 Apr. Vol 12. No 4 pp 438-447 With 3 figs & 1 map [17 refs.]

The cases here described sisters aged seven and four years were typical of the mild acute form of the disease with dacryoadenitis palpebral oedema and regional adenitis no constitutional symptoms of any note but the usual blood changes of anaemia, leucocytosis with relative mononucleosis. The only reason for recording these is that Mercedes is a place where cases have not been seen, or at all events recorded hitherto. These are the seventh and eighth Uruguayan cases.

H H S

TALICE (R. V.) DE MEDINA (Federico) & RIAL (Benito) Nueva observación de forma aguda de enfermedad de Chagas (9° caso uruguayo) con síntomas particulares. [A Case of Chagas Disease with Peculiar Symptoms.]-Reprinted from *An. Facid de Med. Montevideo* 1938. Vol. 23 Nos 4 & 5 8 pp With 2 figs on 1 plate & 1 chart [19 refs.]

This case of a patient in the Department of Paysandú is the ninth Uruguayan case recorded by the authors. The peculiarity in the symptoms referred to in the title consisted in the fact that although conjunctivitis and dacryocystitis were marked and acute there was no regional adenitis, preauricular or carotid but later [? two days but day of disease not stated] there was more general adenitis especially inguinal, and slight enlargement of the spleen leucocytes 11,500 per cmm with relative lymphocytosis, 59.4 per cent. The authors incline to the belief that the condition was due to a "septicaemic phase of the trypanosomiasis. Symptoms on the whole were mild but were still present two months after the onset. There was no thyroid involvement

H H S

TALICE (R. V.) Dos nuevas observaciones de formas agudas de enfermedad de Chagas en el departamento de Paysandú (10° y 12° casos uruguayos) [Fresh Observations of the Acute Form of Chagas Disease in Paysandú.]-Reprinted from *Arch. Uruguayos de Med. Ciruj. y Especialidades* 1938. June. Vol 12. No. 6 pp. 645-651 With 3 figs. [20 refs.]

Two more cases of the "mild acute" form of this disease one an adult of 28 years and the other a child of three years occurring in the Paysandú Department of Uruguay. They were typical and call for no comment.

H H S

TALICE (R V) ALAMBARRI (A) & REGULES (U) Forma aguda de enfermedad de Chagas en un niño del Rincón de Cololó (Dpto de Soriano) (11° caso uruguayo) [Case of Chagas Disease in a Child at Rincón Cololó].—Reprinted from *An Facul de Med* Montevideo 1938 Vol 23 Nos. 9 & 10 7 pp With 1 plate. [24 refs.]

The patient was a boy of six years with typical symptoms. This is the eleventh case to be reported in Uruguay. The only reason for drawing attention to it here is that treatment consisted of Sulfanil Emar by mouth two tablets daily of 0.3 gm for fifteen days. In a few days the oedema dacryoadenitis and the glandular enlargement subsided and no trypanosomes were found on examination of a thick drop of blood. When he was seen eleven weeks later the symptoms were still in abeyance except that the pre auricular and carotid glands on one side were palpable there was no enlargement of spleen or thyroid. The author is of the opinion that the sulfanil was highly beneficial and he intends to test it in future cases in man and also experimentally (in animals) H H S

TALICE (R V) Epidemiología de la enfermedad de Chagas en el Uruguay [Epidemiology of Chagas Disease in Uruguay]—*Arch Uruguayas de Med Cirug y Especialidades* 1938 July Vol 13 No 1 pp 45-60 With 2 maps. [21 refs.]

TALICE (R V) LOUSTAL (H L) & SARRIZA (J P) Primera observación de forma aguda de enfermedad de Chagas en Carmelo (Dpto de Colonia) [The First Case of Acute Chagas Disease observed in Carmelo].—Reprinted from *An Facul de Med* Montevideo 1938 Vol 23 Nos. 9 & 10 16 pp With 8 figs. on 4 plates & 1 chart. [24 refs.]

MARZA (Salvador) JÓRC (Miguel E) & FEIJÓO (E J Canal) Investigaciones sobre la Enfermedad de Chagas. Primer caso crónico mortal de forma cardíaca de enfermedad de Chagas demostrado en Santiago del Estero [Study of a Chronic Case of Chagas Disease ending Fatally].—*Universidad Buenos Aires Misión de Estudios de Patología Regional Argentina Jujuy* 1938. Publicación No 38. 75 pp With 61 figs. [15 refs.]

This long and detailed account cannot be satisfactorily abstracted. It concerns a girl who was six years old when first observed by one of the authors (E. J. C. F.) in September 1926 when she gave a history of fever and headache for the preceding 15 days and had a slow arrhythmic cardiac action. She was seen at intervals till her death 10 years 5 months later. The last fifty pages are devoted to a very minute description of the histopathological changes in the heart and liver with abundant illustrations photomicrographs very well reproduced. The former showed chronic infiltrative myocarditis with polymorphonuclear and eosinophil infiltration and disorganization of striation in places. These are changes which have been found in other fatal cases of American trypanosomiasis and in animals subjected to experiment. There was also focal endocarditis with some oedema the liver showed nothing very characteristic. [Unfortunately trypanosomes do not seem to have been looked for in the earlier

and in thick drops was examined of 30 persons and the same number of animals and inoculations made into guinea-pigs and white mice with entirely negative results. There is little doubt however in the author's mind that Chagas' disease does exist in the district because the infestation index among *Triatoma* is fairly high in some parts and probably xenodiagnostic methods might reveal its presence.

Altogether 1 097 specimens of *Triatoma* were examined 382 from Carem 178 from Cajón del Maipo 25 from Lepe and 2 from Melipilla. Of those from Carem 405 (45 per cent.) were infested 292 of 564 adults (51 per cent.) and 113 of 324 larval and nymphal forms (26 per cent.). In Cajón del Maipo 63 were positive among 178 (35 per cent.) 50 out of 108 adults (46.3) and 13 of 70 in larval and nymph stages (18.5). Nine of the 25 from Lepe were positive. Of the two one imago and one larva from Melipilla neither was infested. H H S

TALICE (R. V.) Xenodiagnóstico positivo en una niña que un año antes presentó una forma aguda de enfermedad de Chagas. (18° caso uruguayo) [Xenodiagnosis in Chagas Disease].—Reprinted from *An. Facul. de Med. Montevideo* 1938 Vol. 23 Nos 9 & 10 10 pp [24 refs]

A girl, seven years of age, was attacked in April 1937 with Chagas disease in an acute form. When she was seen again a year afterwards there was slight oedema of the right eyelids (the side affected the year before had been the left). A xenodiagnostic test was made with positive results. [Nothing is said regarding blood examination for trypanosomes.] The author interprets this as a re-infection, since according to the parents, the child had been in good health in the interval. H H S

DIAS (Emmanuel) Persistence de l'infection par le *Schizotrypanum cruzi* chez l'homme. Xenodiagnostic positif dans deux cas, 18 ans après l'isolement. [Persistence of *T. cruzi* Infection in Man. Xenodiagnosis in 2 Cases, 18 Years after Isolation.]—*C. R. Soc. Biol.* 1933. Vol. 129 No 27 pp 430-432

In September 1922, two patients in the chronic stage of Chagas disease were admitted to the Oswaldo Cruz Hospital at Rio de Janeiro. These patients were women, aged 32 and 28 years respectively and came from the north of the State of Minas Geraes. Since 1922 they have frequently given positive Machado reactions.

In one of the patients (T) the presence of *T. cruzi* was demonstrated 12 years after her removal from the endemic area. In the other patient (A) inoculation of blood into a guinea-pig gave a positive result. Since 1934 periodic attempts have been made to find the parasite in the blood. Inoculation of the blood of T into a guinea-pig was positive on 25th May 1934 after VILLELA had obtained two negative results. Patient A, whose blood was injected into a guinea-pig on the 24th March 1923 gave negative results on the 1st November 1933 and 25th May 1934.

The xenodiagnostic test performed on both patients with *Pan. strongylus* (*Triatoma*) *marginatus* bred in the laboratory gave positive results on 14th February 1933. W Y

VLAZA (Salvador) Instrucciones para el diagnóstico de laboratorio de enfermedad de Chagas [Instructions for Laboratory Diagnosis of Chagas' Disease.]—*Instrucción No 1 Misión de Estudios de Patología Regional Argentina* 11 pp With 7 figs

This is a short paper presumably for the information of the general practitioner instructing him how to take a thick drop of blood for examination for trypanosomes how to carry out the venodiagnosis test how to collect blood in a Bayer's venule for inoculation into animals and in another for the Machado-Guerreiro reaction and how to obtain a fragment of lymphatic gland and forward them to the laboratory Illustrations depict details for the two first of these
H H S

TALICE (R V) Primeras observaciones en el Uruguay de gatos espontáneamente infectados por el *Trypanosoma cruzi* [First Observation in Uruguay of Cats suffering from *T cruzi* Infection.]—*Arch Uruguayos de Med Cirug Especialidades* 1938 July Vol. 13 No 1 pp 61-65 [21 refs]

That cats may be naturally infected with *T cruzi* was proved many years ago by Chagas himself in Minas Geraes. The author has found the same to occur in Uruguay
H H S

CULBERTSON (James T) & KOLODNY (Maxwell H) Acquired Immunity in Rats against *Trypanosoma cruzi*—*Jl Parasitology* 1938 Feb Vol. 24 No 1 pp 83-90

The experiments described in this paper have shown that rats which have recovered from a *Trypanosoma cruzi* infection are completely immune to re-infection. Administration of serum of a recovered animal prophylactically will not prevent but will reduce the severity of an infection. When an infection has been established serum will reduce the number of trypanosomes in the blood but these will increase again when the immune serum has been eliminated.

C M Henyon

LEPROSY

PAPERS OF ABSTRACTS IN THIS SECTION

GERMOND (p. 234) emphasizes the benign character of the leprosy found in eastern Basutoland. The incidence is probably a little over 2 per 1,000 but is lower in the surveyed lowlands than in the surveyed highlands. Nutrition is good at present. Treatment is by intradermal chaulmoogra esters. LOWE (p. 235) regards the problem in Burma as serious with incidence of from 1-6 to 5-6 per cent of the population and with a high proportion of serious cases. SARDJITO MOCHTA and TJITRONOEROJO (p. 235) found 330 cases in a survey of Blora (Java). They describe the measures taken for the discovery of the cases, the classification and treatment adopted. KOESLAN (p. 236) shows that the incidence of leprosy varies directly with the degree of contact in various environments. SAKOYAMA, YAGAI and MAEDA (p. 236) consider that leprosy tends to be more severe in colder than in warmer climates. LOWE (p. 236) considers that leprosy is more severe in Burmans than in Indians in Burma although the Burmans are better fed. He therefore postulates a racial factor in resistance.

DE MOURA (p. 237) gives the results of a study of 971 cases in Paraná. The mixed form was found in two-thirds of the patients. PINKERTON (p. 237) shows that in leprotic ulceration of the nose the bony structures escape. Nodular lesions of the tongue, soft palate and larynx occur. Chaulmoogra is not of much assistance and in laryngeal lesions rest of the voice as in tuberculosis affords most relief. RODRIGUES and GUTYTO (p. 238) describe the clinical features found in a re-survey of Cordova in the Philippines. COCHRANE and RAJAGOPALAN (p. 238) class very early cases as "precutaneous" when they have not developed definitely into either cutaneous or neural. The patients are usually under 14 and usually give a history of contact with a well-developed cutaneous case. SLOAN (p. 238) describes leprosy affecting the prepuce. BALISA and BASOMBINO (p. 238) suggest a classification of leprosy and RABILLO and RABILLO (p. 239) discuss their own.

RABILLO (Jr) (p. 239) discusses tuberculoid leprosy which is a result of a blood distribution of bacilli to skin, nerves and glands. He also discusses the allerge-specific reactions in this condition. PARMARSON (p. 239) considers that tuberculoid changes in nerve leprosy may be related to the presence of a certain degree of immunity. Twelve of 56 nerve cases in Estonia showed these changes in varying degrees. TRISSEUIL (p. 240) from tests with skin grafts, believes that spread in tuberculoid patches is due to bacilli in the extending edge, and not to trophic or toxic effects.

MARCHOUX and PRUD'HOMME (p. 240) describe a method of determining *in vitro* without culture whether leprosy bacilli are alive or dead. By this means they have arrived at conclusions as to the longevity of the bacilli under conditions of heat and desiccation. The bacillus of human leprosy is killed at 60°C. in 30 minutes. PRUD'HOMME

(p 240) by the same method found that the bacillus of rat leprosy is killed at 100°C in 5 minutes, and by other agents in various periods.

BURNET (p 240) succeeded in infecting a hamster with human leprosy bacilli thus confirming the work of ADLER. MARCHOUX and CHORINE (p 241) found it possible to infect a rat with five rat leprosy bacilli only. The development of the disease was slow.

GOMES (p 241) reports that both filterable and non filterable forms of rat leprosy bacilli occur in the nasal mucosa of rats 24 hours after infection. COWDRY and RAYOLD (p 241) describe rosette shaped masses of bacilli in rat leprosy unlike the faggot like masses of the human bacilli. DE SOUZA ARAUJO (p 241) found bacillaemia in experimental rat leprosy with bacilli in the nasal mucus and the faeces. Possibly they appear in the nose through infection from the faeces. SELLARDS and PINKERTON (p 242) report that the intra cerebral injection of rat leprosy emulsions into monkeys rabbits white rats and mice produces progressive and often generalized lesions. White mice may be infected by injection into the spleen liver or peritoneal cavity. In monkeys only low grade infections were produced by human leprosy material. The invasion of reticulo-endothelial cells is discussed.

ROTBURG (p 242) considers that the tuberculin reaction is not a group reaction and found that the percentage of lepers reacting to it was only slightly higher than that of non lepers. PEREIRA (p 242) working with the reaction of Lleras Acosta obtained results which differed considerably from those obtained by that author. SPEIGHT (p 243) gives results of the serum formalin reaction in leprosy. DI LIDDO (p 243) tested the Witebsky Klingstein and Kuhn reaction in lepers, contacts and controls but found the results to be of little diagnostic value.

BOENJAMIN (p 244) describes a syndrome in which the diagnosis between leprosy and syringomyelia was made by the microscopical examination of a thickened nerve which showed acid fast bacilli and the histological appearances of leprosy. He advocates this method.

COELHO (p 244) describes six lepers with infantilism and concludes that leprosy acquired up to the age of puberty may bring about this condition.

PARAS (p 245) found that of the chemical fractions of leprotic nodules only the wax appeared to possess significant biological properties in producing skin reactions.

DE SOUZA ARAUJO (p 245) obtains better results by combinations of many different treatments (which he details) than by the chaulmoogra treatment alone. BOENJAMIN (p 245) reports satisfactory results of treatment with 4828-a. The leprosy reaction if set up may be treated with ommadin. The Central Leprosarium of Goa and the treatments used there are described (p 246). ROSS (p 246) describes the biochemical changes (all temporary) which occur in the blood during treatment by pyretotherapy. Renal function is impaired but not permanently. BASU (p 246) reports on the value of animal protein in diet. RYRIE (p 247) records success in the treatment of leprotic ulcers with dettol locally and intravenously and BETZ (p 247) used cod liver oil locally while MEHTA (p 247) injects a solution containing rivanol, glucose and other constituents at a distance from the ulcers and a very similar solution intravenously. C II

- i. GERMOND (R. C.) A Leprosy Survey of the Eastern Border Districts of Basutoland showing the Results of Strict Segregation combined with Inspectorate Control, and the History of a Leper Family — *Internat. J. Leprosy* Manila. 1938. July-Sept Vol. 6. No. 3 pp 303-314 With 3 figs. (2 maps)
- ii. BASUTOLAND ANNUAL MEDICAL AND SANITARY REPORT 1937 [DYKE (H W) P.M.O.] Appendix IV pp 42-48.—Annual Report on the Leper Settlement at Botabelo, Basutoland for the Year ended 31st December 1937 [GERMOND (R. C.) M.O.]
- iii. BASUTOLAND ANNUAL MEDICAL AND SANITARY REPORT 1937 [DYKE (H W) P.M.O.] Appendix V pp 47-50 —Report of a Leprosy Survey of Part of the Lowlands of Mafeteng District January 19th to February 2nd, 1938 [GERMOND (R. C.) M.O.]

1 The author summarizes the results of this survey as follows —

1 A leprosy survey of the eastern border districts of Basutoland is described

2 The results are summarized 13 157 individuals examined, 42 new cases found.

3 The extraordinary benignity of these cases is stressed 90.5 per cent are N1 while only 7.1 per cent were C1 and 2.4 per cent C1 N1

4 More than 50 per cent. of the neural cases are clinically almost negligible, the rest are early and slight.

5. Most of the recurrences are extremely mild, and none of them severe or obviously infectious

6 The position revealed by the survey is described as highly encouraging, if not unique.

"7 There seemed to be no definite relationship between malnutrition, scabies, and syphilis on the one hand and leprosy on the other

8. The most heavily infected families were well nourished, but very dirty

"9 The probable incidence of leprosy in Basutoland is estimated at a little over two per thousand of the population.

"10 The present satisfactory position is attributed to the success of the Native Leprosy Inspectorate established in 1929

11 The methods employed by these inspectors are described. The writer is of the opinion that the employment of natives is essential."

ii The report on the Basutoland Leper Settlement at Botabelo shows a decrease of 15 at the end of the year 1937 to 689 in spite of a number of admissions due to the surveys dealt with above. Among 83 admissions in 43 or 48.9 per cent the disease was of not more than 12 months duration in 17 per cent. it was 13-24 months in 13.6 per cent. over two years and in the remainder unknown but mostly of long duration. This shows a high proportion of early cases. Between 1929 and 1938 the proportion of admissions within 12 months of the onset of the disease has risen from 36.8 to 52.2 per cent. The average age of development of symptoms was at the unusually high figure of 36.7 years and has remained almost constant for seven years. The admissions of children up to 16 years remain from 15 to 16 per cent. Intradermal chaulmoogra esters constitute the routine treatment, and 71 patients were discharged during the year their disease having been arrested. Contentment of the inmates has been successfully fostered by social amenities. [See this *Bulletin* 1938 Vol. 35 p 285 for previous Basutoland reports.]

iii. The results of this further survey are summarized thus by the author —

- 1 The general nutrition of the population is an extremely unstable factor. It is at present excellent in the lowland area recently examined whereas in the depression (1933 and 1934) and for a year or more afterwards it was one of the worst in Basutoland.
- 2 The incidence of scabies is much lower in the lowlands than it was in the mountain area examined in 1936. The comparison is especially interesting with the well nourished population of the Melikane Valley.
- 3 The incidence of active external syphilis was found to be the same in the lowlands as in the mountain area.
- 4 The incidence of leprosy is very much lower in the surveyed part of the lowlands than in the surveyed part of the Eastern highlands. This is strikingly illustrated by the following comparison —

Melikane Valley (1936) incidence	8 per mille
Qacha's Nek South	4
Quthing District	2
Mateteng Lowlands (1938)	1

L. Rogers

LOWE (John) The Leprosy Problem in Burma.—*Leprosy in India*
1938 Oct Vol. 10 No 4 pp 120-131

This paper contains much information gleaned during a short tour in Burma. The census figures of advanced cases are quoted to show that the highest leprosy rates occur in a central belt from the Arrakan Hill tracts in the west to the Shan States in the East. Surveys indicate an incidence of about 1.6 per cent of the population rising in places to from 3 to 5 per cent. Examination of 586 village children gave the high rate of 5.6 per cent. The more serious lepromatous type formed 60 per cent and neural cases 40 per cent. This shows a larger proportion of serious cases than in India proper. In institutions the lepromatous type formed 70 per cent, and in out-patient clinics no less than 56.5 per cent. The problem in Burma is thus a very serious one. It was also observed that the villagers often isolate lepers generally at a little distance from the village and the encouragement of this system and the founding of leper colonies at small cost are recommended as prophylactic measures.

L. R.

SARDJITO (M) MOCHITAR (A.) & TJITROHOEPOJO (M. Soeparmo Honggopatij) De voortgang van lepra fieldwork in het Regentschap Blora. [Continuation of Leprosy Fieldwork in the Regency of Blora.]—*Geneesk Tijdschr v Nederl Indië* 1938 July 26 Vol. 78 No 30 pp 1822-1830

A survey of the Regency of Blora revealed 330 cases of clinical leprosy, distributed in 129 of the total 296 villages. They were classified into 192 V (nerve) 63 C (cutaneous) and 75 CN (mixed) cases of which 53 (16 per cent) were children under 15 years. As there were 29 sample polyclinics distributed through the regency no leprosy individual was more than 3 km. distant from one of these. Bedridden patients were visited at their own homes and therefore it could be said that systematic medical treatment was at the disposal of all. Treatment consisted of administration in low dosage of iodized ethyl chanimoogra ethylate intramuscularly (this *Bulletin* 1936 Vol. 33

p 611) A grading of the degree of leprosy infection was indicated by subdividing nerve cases into categories N_1 , N_2 , N_3 and the cutaneous cases similarly into C_1 , C_2 , C_3 . In tracing leprosy cases inspection was directed especially to sufferers from any sort of skin disease and lepers were thus discovered who would not otherwise have been found. Although co-operation was obtained from all the authorities it was found that the village police brought up for inspection almost entirely advanced cases of leprosy. It was the institution of treatment itself which resulted in the voluntary presentation of the early cases and this fact gives cause for hope that such patients may at least be prevented from joining the ranks of the advanced lepers. It is still too early to pronounce on the attainment of definite cure and improvement. The mortality due to leprosy may be already said to be under check and control.

W F Harvey

KOESLAN Een bijdrage tot de epidemiologie der lepra ten platte lande in het Regentschap Lamongan Java [Leprosy in the Regency of Lamongan, Java.]—*Geneesk Tijdschr v Nederl Ind* 1938 July 26 Vol. 78 No. 30 pp. 1792-1806. With 5 figs. on 3 plates.

Leprosy is essentially a contact disease and it is to be expected therefore that intimacy and duration of contact will be powerful factors in the development of infection. The author goes rather elaborately into detail on the subject of the degree of contact between individuals which is to be ascribed to the family the circle (fellow workers, playmates etc.) the village and to an indeterminate class. These he works out to be family/circle 48/1 circle/village 5/1. The case incidence of leprosy for each category is proportionately — family circle village intermediate 10-4 1.78 0.63 0.3

W F Harvey

SHIONUMA (Emosuke) NAGAI (Kenji) & MAKIDA (Tei) The Climate Theory in Leprosy.—*Internat. J. Leprosy* Manila. 1938 July-Sept. Vol. 6. No. 3. pp 315-324 With 1 fig

As the result of their inquiries in Japan the authors support the view that the warmer the climate the less severe the symptoms of leprosy for they found the disease to be relatively mild in the warmer southern islands, with fewer cases of the lepromatous and more of the nerve type. The differences observed could not be explained as due to longer duration of the disease. They also found that alopecia leprosa eye lesions and nerve symptoms are more severe in the colder areas.

L. R.

LOWE (John) A Note on Racial Variations in Leprosy with Particular Reference to Indian and Burmese Races.—*Indian Med. Gaz.* 1938. Oct. Vol. 73 No. 10 pp 591-606 With 8 figs. on 2 plates. Also in *Leprosy in India* 1938. Oct. Vol. 10 No. 4 pp. 132-139

This paper is also the outcome of a three and a half weeks survey tour in Burma dealt with above. In a Bengal survey neural cases formed 82 per cent. of the total cases, and the Philippine Islands showed a proportion of 50 per cent. In Burma the Rangoon Leper

Asylum leprosy clinics and village data respectively showed in Burmans 75.56 and 53 per cent. of lepromatous cases and in Indians 39 and 31 per cent. in the two first series. The disease is thus more severe in the Burmans than in Indians in Burma although many of the latter had contracted the disease in Burma. The evidence indicates that both races become infected in childhood but age data indicates that leprosy develops earlier in the Burmans. Further tuberculoid cases and nerve abscesses are rarer in Burma than in India. Yet the Burman is better fed than the Indian although the former indulges in a stale fish product. The author therefore suggests that the Burmans have a hereditary and racial lack of resistance to leprosy infection. L. R

DE MOURA (Aureliano M.) Estudo bio-estatístico de 971 casos de lepra no Hospital Colônia S. Roque. [A Study of 971 Cases of Leprosy in the S. Roque Colonial Hospital, Paraná.]—20 pp English summary 1938. Curitiba—Paraná Empresa Gráfica Paranaense.

This study is in the main statistical at all events it deals with figures variously manipulated. Of the total 95.1 per cent were white 91.3 per cent. Brazilians the incidence in males was more than double that in females, 69.6 and 30.4 per cent respectively. 73.3 per cent. were over 20 years of age. Four fifths of the patients came from Paraná State and 10.5 per cent. from São Paulo. The mixed form was found in two-thirds of the patients the maculo-anaesthetic in 18.9 and the nodular in 14.4 per cent. The initial lesions occurred on the face in 27.8 per cent. then in order forehead 11.2 hands 10.8 feet 8.8 and legs 8.3 per cent. These figures are given also in tables and further subdivided into age and sex groups and frequency of the different symptoms and their sites.

Of non Brazilian patients 64 in number the ages ranged between 28 and 78 years most occurring in the fifth decade. In them also the mixed form predominates 63.1 per cent. The shortest time of residence in the country before the appearance of symptoms was 4 years one had been 68 years resident. H H S

PINKERTON (Forrest J.) Leprosy of the Upper Respiratory Tract. Discussion of Early and Moderately Advanced Cases.—*Jl Amer Med Assoc.* 1938 Oct 15 Vol. 111 No 16 pp 1437-1442. With 14 figs.

This paper is based on seventeen years experience at the Honolulu receiving hospital and the Molokai Settlement and gives a well illustrated account of the leprosy lesions of the mouth nose and larynx. The author stresses the atrophy and destruction of the cartilages of the nose and septum and the escape of the bony structures in which leprosy differs from syphilis. This leads to falling in of the nasal tip. The sinuses appear to escape damage. Perforation of the septum is common but he has not seen that of the hard palate occur in leprosy. Nodular lesions of the tongue soft palate epiglottis and other portions of the larynx are described and illustrated. He has not seen much good from chaulmoogra preparations in these advanced distressing cases including spraying the larynx with them but the use of bland oils in that way seems to be agreeable to the patient. Rest of the voice as in tuberculosis affords most relief. L. R

RODRIGUEZ (Jose N.) & GUINTO (Ricardo S.) A Field Study of Leprosy II. Re-examination of Cases of Leprosy at Cordova, Cebu Province, Philippine Islands.—*Internat J Leprosy* Manila 1938. July-Sept. Vol. 6 No 3 pp 285-302.

This paper deals only with the clinical features of a re-survey of the town of Cordova in the Philippines two years after the first inquiry in 1933. Several new cases were found although not all of the population of some 8,000 were examined. In 1933 20 of 45 closed cases were classed as active but only 13 were so two years later and the improvement tended to be greatest among females. Of 15 positive cases on parole two had died and four relapsed. Of nine formerly suspicious cases three were still so regarded and three were not leprosy. Six new open cases had developed in the two years only one of whom was a house contact.

L. R

COCHRANE (R. G.) & RAJAGOPALAN (G.) An Investigation Center for the Study of Childhood Leprosy.—*Internat J Leprosy* Manila 1938. July-Sept. Vol. 6 No 3 pp 325-330 With 6 figs. on 2 plates.

The author once more stresses the importance of leprosy in childhood and describes the formation of a clinic at Sandpet near Madras, for the study of the problem following a preliminary survey revealing a high incidence. Among 1,871 pupils of schools in the area 65 were classed as probably leprotic 40 as showing early and 3 late leprotic signs. He classes very early cases that have not yet developed definitely into either cutaneous or neural as "precutaneous" and they usually gave a history of contact with a well developed cutaneous case. Colour photographs are necessary to show clearly these lesions and the patients are nearly always below 14 years old. They resemble Muir's "juvenile leprosy".

L. R

SLOAN (Norman R.) Circumcision in Leprosy.—*Internat J Leprosy* Manila 1938. July-Sept. Vol. 6 No 3 pp 358-360

This is a brief note on a case of cutaneous leprotic lesions of the prepuce of such severity as to cause retention of urine and necessitate circumcision.

L. R

RYAN (Gordon A.) An Infantile Macular Eruption.—*Internat J Leprosy* Manila 1938 July-Sept. Vol. 6 No 3 pp 357-358

HARRISON (G. F.) A Case of Leprosy in a British Soldier.—*Jl. Roy Army Med Corps* 1938 Sept. Vol. 71 No 3 pp 184-189 With 2 figs.

BALISA (Pedro L.) & BASCOURIO (G.) Classification des formes cliniques de lèpre [Clinical Classification of Leprosy].—*Rev Brasileira de Leprologia* São Paulo 1938. Sept. Vol. 16 No. 3 pp. 225-228.

The authors discuss the Manila classification and suggest the following —

- I. Cutaneous or Lepromatous (C or L)
- II. Maculo-anaesthetic (Ma)

III Tuberculoid (Tde)

IV Nervous (N) Purely nervous without maculo-anaesthetic lesions.

V Combinations of the foregoing

Definitions of the terms used are given

L R

RABELLO (Ed.) & RABELLO Jr Une classification clinico-épidémiologique des formes de la lèpre. (Clinical-Epidemiological Classification of Leprosy)—*Rev Brasileira de Leprologia* São Paulo 1938 Sept Vol. 6 No 3. pp 229-243

This paper discusses in a general way the principles on which the authors founded the classification they set out in a recent paper [this *Bulletin* 1938 Vol. 35 p 290]

L R

RABELLO Jr Etiologie générale et pathogénie de la lèpre tuberculoïde. [Aetiology and Pathogenesis of Tuberculoid Leprosy]—*Rev Brasileira de Leprologia* São Paulo 1938. Sept Vol 6. No 3 pp 291-314

This paper is a lengthy discussion on the incidence and nature of the tuberculoid type of leprosy. Under aetiology the author mentions the presence of lepra bacilli in small numbers, reactions to the antigens of the bacilli shown by positive Mitsuda tests indicating good resistance and the morphological reactions of the affected tissues. He shows that this type has now been recognized over nearly world wide areas in varying proportions including 10 per cent. of Brazil cases. It differs from lupus in not having a predilection for children and is relatively common in females, but he found it of nearly equal incidence in white and dark races. Familial and conjugal infections are frequent with this form, although it is itself scarcely at all contagious. The author discusses fully the types of tissue and antigenic reactions. The lesions result from the bacilli being distributed through the blood stream to the skin nerves and lymph-gland tissues which afford suitable conditions for their growth. He recognizes three forms of allerge-specific reactions the first to antigens like vaccine lymph or tuberculin the second with high haemo-sedimentation and negative Mitsuda test and the third with low haemo-sedimentation and positive Mitsuda reaction

L R

PARMAKSON (P) Ueber die tuberkulösen Veränderungen bei Nervenlepra in Estland. [Tuberculoid Changes in Nerve Leprosy in Esthonia.]—*Arch f Schiffs u Trop Hyg* 1938. Sept Vol. 42. No 9 pp 401-412. With 6 figs. [23 refs.]

The author reports an examination of 144 compulsorily isolated lepers in Esthonia including 88 cutaneous and 56 nerve cases. Among the latter 14 showed active skin lesions and histological examination showed fully developed tuberculoid changes in two moderate changes in four and slight ones in six cases but no such appearances in two. The tuberculoid changes appeared to be peculiar to nerve cases, and the character of the lesions may possibly be related to the presence of a certain degree of immunity

L R

TISSEUIL (J.) Différenciation par greffes dermo-épidermiques des différentes zones des taches de lèpre tuberculoïde. [Differentiation of the Zones of Tuberculoïd Patches by Skin Grafts.]—*Bull Soc Path Exot* 1938. Oct. 12. Vol. 31 No. 8. pp. 696-698.

The author records the results of grafting portions of healthy skin adjacent to either the active edge of a tuberculoïd patch or to a central quiescent portion of a patch. In the former case the healthy skin graft is invaded from the edge of the tuberculoïd patch, but no extension takes place from the centre of such a lesion. The author concludes that the spread is due to the presence of the leprosy virus in the extending edge and consequently the increase of the lesion is not due to trophic or toxic effects.

L. R.

MARCHOUX (E.) & PRUD'HOMME (R.) Le bacille de Hansen meurt en moins de trente minutes à la température de 60° et par dessiccation. [Hansen's Bacillus killed in Less than Thirty Minutes at 60°C. Heat and by Desiccation.]—*Bull Acad M/d* 1938. Oct. 4 102nd Year 3rd Ser Vol. 120 No. 28. pp. 174-176.

PRUD'HOMME (R. O.) Moyen de reconnaître *in vitro* si le bacille de Stéfansky est mort ou vivant. [In Vitro Recognition of Living Stéfansky's Bacillus.]—*Ann Inst Pasteur* 1938 Nov Vol. 61 No. 5 pp. 512-518.

In these papers a method is described for the recognition *in vitro* without cultures, whether the human and the rat leprosy bacillus is living or dead. It is based on a reducing colour reaction produced by living, but not by dead organisms. O-cresol-endo-2-6-dichlorophenol is the reagent chiefly used in the experiments, by means of which the lethal action of heat and chemicals has been tested on the leprosy bacillus with the following results. A temperature of 60°C. kills Hansen's bacillus in 30 but not in 15 minutes. If the organism is desiccated over sulphuric acid, and then suspended in normal saline the reducing action occurs but not after the organisms have been washed three times.

The second paper records work on similar lines on Stéfansky's rat leprosy bacillus, which is killed by heating to 100°C. for five minutes, by the action of 1 in 100 formal in fifteen minutes and by ultra-violet rays in ten minutes. The emulsions employed contained very large numbers of bacilli. This method enables the vitality of the bacilli to be determined quickly without the use of prolonged animal experiments.

L. R.

BURDET (Étienne) Inoculation positive de la lèpre humaine au hamster [Positive Inoculation of a Hamster with Human Leprosy]—*C R Acad Sci* 1938. Oct. 17 Vol. 207 No. 16. pp. 690-692.

This note records confirmation of the work of ADLER (this *Bulletin* 1938, Vol. 35 p. 293) in infecting a hamster with human leprosy bacilli in an emulsion.

L. R.

MARCHOUX (E) & CHORINE (V) Cinq bacilles de Stefansky suffisent pour infecter le rat blanc. [Infection of White Rat with Five Stefansky Bacilli].—*Ann Inst Pasteur* 1938 Sept Vol. 61 No 3 pp 296-299

It is known that very few tubercle bacilli may suffice to infect animals. The authors have carried out similar trials with the bacillus of rat leprosy and have demonstrated that five may suffice to infect white rats with certainty but with slower development of the disease than after larger numbers

L R

GOMES (J M) Pesquisas sobre a lepra murina eliminação de virus. [Elimination of the Virus of Rat Leprosy].—*Rev Brasileira de Leprologia* São Paulo. 1938. Sept. Vol. 6. No 3 pp 273-290 English summary

The author concludes from experimental inoculations of rats with a filtrate of Stefansky's bacillus that within 24 hours the organisms commence to be eliminated through the nose both as acid fast bacilli and in a filterable form. He noted a similar occurrence in a sporadic form in advanced cases of rat leprosy. The presence of filterable germs in the nasal mucous membrane was shown by the fact that emulsions of it filtered through a Seitz filter were infective by inoculation into rats with the appearance of acid fast bacilli in the lymph glands.

L R

COWDRY (E. V) & RAVOLD (Amand) Rosettes in Rat Leprosy.—*Puerto Rico Jl Public Health & Trop Med* 1938 Sept. Vol. 14 No 1 pp 3-15 With 10 figs on 2 plates. [12 refs] [Spanish version pp 16-17]

The authors describe and illustrate by microphotographs the intracellular formation of rosette shaped masses of lepra bacilli in rat leprosy which differ from the faggot-like masses of Hansen's bacillus in globi in that the Stefansky bacilli are arranged radially. There may be a clear space around them and separate rod-shaped bacilli may be seen in other parts of the same large multinucleated cell containing a rosette which were stained by the Ziehl-Neelsen method.

L R

DE SOUZA ARAUJO (H C.) A lepra dos ratos. [Rat Leprosy].—*Memo. Inst Oswaldo Cruz* 1938 Vol. 33 No 2. pp. 297-318. With 3 plates. [28 refs.]

The first half of this article reviews facts already known—the history, distribution, transmission, experiments with Stefansky's bacillus and the disease set up in rats. In the second part is an account of experiments carried out with three strains of the organism obtained one from Professor FICKER in Germany, one from Professor MARCHOUX in Paris and a third from Professor LAIDLAW in London.

Inoculation produced inflammatory granuloma. With the French strain infection was contracted by healthy rats in contact with diseased, but it was less virulent than the English strain. A bacillaemia is produced and the organisms are to be found in the nasal mucus and are eliminated in large numbers in the faeces. It may be that some of those with bacilli in the nasal mucus have been infected from the latter. Attempts to cultivate the organism from the three strains acquired were not successful.

H H S

1. SELLARDS (Andrew Watson) & PINKERTON (Henry) The Behavior of Murine and Human Leprosy in Foreign Hosts.—*Amer J Path* 1939, July Vol. 14 No. 4 pp 421-434
- d PINKERTON (Henry) & SELLARDS (Andrew Watson) Histological and Cytological Studies of Murine Leprosy.—*Ibid* pp 435-442. With 8 coloured figs. on 1 double plate

i. This is a comprehensive account of experimental animal inoculations of rat and human leprosy bacillus emulsions which is largely confirmatory of earlier work. In addition it is shown that intracerebral injections of murine leprosy produced progressive lesions, often accompanied by generalization through the internal organs, in monkeys rabbits, white rats and mice but not in guinea-pigs. White mice of mixed breeds were readily infected by injection into the spleen, liver or peritoneal cavity but usually only abortive lesions resulted from subcutaneous injection except in some inbred strains. White mice have been infected by passage for four years.

In the case of human leprosy material in rhesus monkeys only low grade infections were produced, as by other workers. Rats have been infected intracerebrally from the pia mater of a monkey and acid-fast bacilli found up to 3½ years without progressive disease or active lesions developing.

ii This paper is illustrated by good coloured plates to demonstrate the invasion of the mesenchymal cells of the reticulo-endothelial system by rat leprosy bacilli in the case of the liver spleen brain sheath of a spinal nerve testis, stomach, striated muscle, bone lungs and to a slight extent the kidney. In animals surviving for long non-vacuolated cells filled with lepra bacilli develop in most organs. Non-pathogenic acid fast bacilli on the other hand, disappear within a few weeks after intracerebral injection into animals and never produce metastatic lesions. L. R.

- ROTHBERG (Abrahão) Estudos sobre as reações tuberculínicas na lepra [Tuberculin Tests in Leprosy].—*Rev Brasileira de Leprologia* São Paulo 1938 Sept Vol. 6, No. 3 pp 245-272. [38 refs.] English summary.

The author has studied in 242 lepers the Mantoux reaction with a 1-10,000 dilution of Dorset's synthetic tuberculin, but found positive reactions to be only a little more frequent than in non-lepers. He therefore considers that the tuberculin test is only specific for tuberculosis and is not a group reaction. L. R.

- PEREIRA (Paulo C. R.) A reação de Lleras Acosta na leprose (Reação de fixação do complemento com antígeno metílico de bacilos ácido-alcool-resistentes). [Reaction of Lleras Acosta (Complement Fixation with Methylene Antigen of Acid Fast Bacilli)].—*Rev Brasileira de Leprologia* São Paulo 1938, Sept. Vol. 6, No. 3 pp 315-339 [15 refs. English summary]

The author reports on 391 reactions carried out with the antigen of LLERAS ACOSTA. He obtained positive reactions in 97.5 per cent. of 120 cutaneous cases of leprosy, in 81.48 per cent. of 32 bacteriologically negative lepers, in 4 per cent. of 100 children of lepers, in 18.42 per cent. of 76 patients with syphilis or other skin affections and in 14 per cent. of 50 healthy persons. These data show large discrepancies

from those of Prof Lleras Acosta. He is continuing his inquiry draws no conclusions at present [See also this *Bulletin* 1938 Vol p 551 and p 887] L R

SPEIGHT (Arthur) Observations on the Serum-Formalin Reaction in Leprosy—*Leprosy in India* 1938 Oct Vol. 10 No pp 117-119

The serum formalin reaction in general use for the diagnosis of kala azar has been tried by the author in 100 cases of leprosy. Positive results were obtained in 55 per cent against only 4 per cent in 50 non lepers. Cutaneous cases gave 63.5 per cent and nerve cases 40.5 per cent of plus reactions. An attempt to correlate the reactions with the sedimentation test was inconclusive L R

LIDDO (Francesco) La reazione di Witebsky, Klingstein e Kuhn nella lebbra. [The Witebsky, Klingstein and Kuhn Reaction in Leprosy]—*Riforma Med* 1938, June 25 Vol. 54 No 25 pp 970-972.

This complement fixation reaction with tuberculous antigen has been tested in lepers for some years [see this *Bulletin* 1934 Vol. 31 p 266 1936 Vol. 33 pp 305-342] with discrepant results.

The author has carried out the test on 40 lepers on 52 relatives and others cohabiting with lepers and 71 controls. The subjects were divided into five groups as follows—

Group I comprising 34 cases of nodular leprosy of whom 29 gave a positive and 15 a negative reaction. 5 with nervous leprosy of whom 3 were positive 2 negative one suffered with the mixed form and he reacted positively.

Group II Fifty two relatives of or living with lepers but presenting no clinical signs of the disease. Eleven of these were positive the rest negative.

Group III Six lupus cases 4 with lupus vulgaris of whom 3 gave a positive 1 a negative 2 with lupus erythematosus both negative. They showed no evidence of tuberculosis.

Group IV Forty suffering from venereal diseases. 1 One with ulcus molle—negative 2 Four with gonorrhoea—3 negative 1 positive 3 Twenty five syphilitics (W.R. positive)—7 positive 16 negative 2 doubtful. 4 Ten syphilitics (W.R. negative)—3 positive 7 negative 2 doubtful. Of the total 40 11 were positive 27 negative and

Group V Twenty-five either free of disease or suffering from some cutaneous affection such as scabies eczema epithelioma. Of these 20 were negative 5 positive and of the latter 3 were healthy persons. Seeing that so large a proportion of non-lepers give a positive and a considerable number of lepers a negative the diagnostic value of the test is not great.

H H S

SOEPARNO (AL) Een groep uit het lepra-werk in het Regentschap Blora en het nut van de daarbij verrichte Takata-Ara-reactie [Leprosy Investigation in the Hageny of Blora. The Takata-Ara Reaction.]—*Geneesk Tijdschr v Nederl Indië* 1938 July 28 Vol. 78 No 30 pp. 1817-1821

considered to be satisfactory. During treatment a leprosy reaction may be set up which is of the nature of an exacerbation of the manifestations of leprosy and may be allergic. The treatment of this reaction was by 5 to 10 injections of ornodin in 2 cc. doses—daily in strong patients and twice weekly in the feeble. By this treatment fever came down by lysis, appetite returned, pain in the joints subsided and lepromata became quiescent again. *W F Harley*

ARQUIVOS DA ESCOLA MÉDICO-CIRÚRGICA DE NOVA GOA. Ser B 1937 No 7 pp 1602-1674 Leprosaria Central de Goa. [The Central Leprosarium of Goa.]

This is a report on the activities of the institute during 1935 and is mainly of local interest. The leprosarium is situated in the village of Macasana in the Sakete municipality; it occupies an area of about 18 hectares and is divided into two parts: in one are housed the patients; in the other the personnel engaged to attend them. During October and November there was an outbreak of influenza, but this did not appear to affect the course of the leprosy. Very brief notes are given of 103 patients treated in the institution during the year; there were 9 deaths. Treatment was by chaulmoogra oil given intravenously in doses of 1 cc twice a week with an interval of a fortnight between series of four injections, or by B.C.C.O. intramuscularly twice a week, by moogrol iodide intradermically, by chaulmoogra by mouth, and by injection of chaulmoogra and coconut oil. Much of the report is taken up by laudatory remarks by visitors to the leprosarium and by a list of subscribers. *H H S*

ROSS (Hilary). Pyretotherapy in Leprosy. Biochemical Changes resulting from Exposure to an Air-Conditioned Hypertherm.—*Internal J Leprosy* Manila 1938 July-Sept. Vol. 8 No. 3 pp 331-350. With 8 figs. (19 refs.)

Five patients in different stages of leprosy were given three courses of weekly treatments, during each of which the patients' rectal temperature was raised to between 105°-106°F for from one to three hours, and in one patient for five hours. Elaborate biochemical tests were carried out on blood obtained from a vein at intervals, which furnished the following information. The acid-base equilibrium was greatly affected to the extent of producing moderate alkalotic tetany in one patient. The total proteins were much reduced from an originally high level. Nonprotein nitrogen, urea, blood chlorides and cholesterol were retained, accompanied by impairment of renal functions, albuminuria and casts, but renal function tests showed no evidence of lasting damage to the kidneys. Haemoglobin and red blood cells decreased, but none of the changes were permanent. Contra-indications to the treatment are noted, but no information as to any results from it is recorded. The tests were made at the Carville Loper Settlement U.S.A. *L. R*

BASU (N. K.). Further Studies on Leprosy and Vitamin B₁₂ (C) Deficiency.—*Ztschr f Vitaminsf* Berne. 1938 Vol. 7 No 3/4 pp 297-298

The author concludes from experiments on white mice that animal protein containing vitamin B₁₂ is superior as a diet to vegetable proteins.

L. R

RYRIE (Gordon A) On the Treatment of Leprotic Ulcers.—*West African Med JI* 1938 Oct. Vol. 10 No 1 p 41

The author reports on the use of the proprietary antiseptic dettol both by injection of two or three ounces of a 30 per cent aqueous solution into the affected tissues and as a 10 per cent solution for irrigation and dressing in leprotic ulceration and pustular inflammation. Injections cause a rise of temperature but rapid improvement resulted in three bad cases. In eleven cases with pocketing or extensive ulceration very gratifying results were also obtained although he does not advise its long use as a dressing as the parts tend to become sodden. Intravenous injections have also been used as a general treatment in 21 patients with definite improvement in three but it is not clear that they are of value as a routine treatment I R

BETZ (Hans) Zur Behandlung leproser Ulcera. [Treatment of Leprous Ulcers].—*Arch f Schiffs u Trop Hyg* 1938 Oct. Vol. 42 No 10 pp 468-470

In this note the author advises the use of applications of cod liver oil containing vitamins which may be combined with chaulmoogra oil or alepol. Similar applications may be made to the nasal lesions L R

MEHTA (H) A Treatment of Perforating Ulcers in Leprosy.—*J Malaya Branch Brit Med Assoc* 1938 Sept Vol 2, No. 2 pp 88-90

The author recommends the injection of the following freshly prepared solution for the treatment of obstinate perforating ulcers of nerve leprosy. Rivanol gr 1 glucose gr 2 calcium lactate gr 1 sodium thiosulphate gr 2 and aqua cc 10. The rivanol should be dissolved separately in warm distilled water and added to the others. For use 3 cc is injected in the sole of foot in ulcers of the big toe and in the calf of the leg in those of the sole of the foot. In addition 1 to 2 cc. is injected in three places around the ulcers into the subcutaneous tissues. Intense pain rigors and fever follow the injections which may be repeated after a week's rest. Small ulcers may heal in three or four days and larger ones after two or three treatments. A very similar solution is also advised intravenously with the addition of trypaflavine and euflavine aa gr 1. Of 287 ulcers 268 are reported to have healed under the treatment L R

CHATTERJEE (Madhab Lal) Treatment of Leprosy.—*Calcutta Med JI* 1938, Nov Vol 34 No 5 pp 413-426 [16 refs.]

SITANALA (J B) Het Noorweegsche systeem van leprabestrijding [The Norwegian Method of dealing with Leprosy].—*Geneesk Tijdschr v Nederl Indië* 1938 July 26 Vol. 78, No 30 pp 1831-1844 With 2 charts.

VILLELA (Gilberto G) The Biochemistry of Leprosy A Review.—*Internat JI Leprosy* Manila. 1933 Jan-Mar & Apr-June Vol. 6 Nos. 1 & 2 pp 61-72 223-232. [108 refs.]

HELMINTHIASIS.

PRÉCIS OF ABSTRACTS IN THIS SECTION

TOTTERMAN (p. 248) found that alcoholic extract of tapeworm if administered *per os* to patients suffering from anaemia due to *Diphyllobothrium* infection, caused a sharp fall in the number of red cells, probably through a mechanism of hypersensitivity. SIEVERS (p. 249) using the complement fixation reaction found that antibodies were provoked in the serum of patients who had previously suffered from tapeworm anaemia, on the administration *per os* of either alcoholic extract of *D. latum* or of dried powdered worm. Controls were negative.

MUELLER (p. 250) describes the progress of *Sparganum mansonoides* infection from the intestinal tract in various hosts. In rhesus monkeys gelatinous swellings in the lower part of the trunk occur due to the burrowing and disintegration of the spargana in the subcutaneous tissues. Previous injections of tapeworm substance prevent this, and the parasites are promptly encapsuled. CORNET (p. 250) advocates surgical treatment for palpebral conjunctival and cutaneous sparganosis rather than intravenous novarsenobenzol.

WANG (p. 251) reports infection by *H. nana* in 0.33 per cent. of a large number of patients examined in Peiping. BACIGALUPO and AGUIRRE PEQUEÑO (p. 251) record a human patient infected with *H. diminuta* in Mexico.

BAXTETT (p. 251) gives figures of the incidence of hydatid infection in Australia and New Zealand. MARANGOS (p. 251) reports six cases of hydatid disease in one family. COUËLEN (p. 252) reports further work on the germinal layer of hydatid cysts. FRIEDRICH (p. 252) calls attention to the diagnosis of *Echinococcus strobilatus*. X-ray examination is useful. LESLIE (p. 252) describes a patient with a hydatid cyst in each lung and STEVENSON and HEGGIE (p. 252) two cases of hydatid disease of the lungs.

HARE (p. 252) records two patients with cysts in the brain. Both had epileptiform fits. DE SÈZE, LAPLANE and FIMMEL (p. 253) discuss the symptoms and diagnosis of cysticercosis of the optic chiasma. The colloidal benzoin reaction is described. ROGERS and TUDHOPE (p. 253) record the operative cure of a patient with a hydatid cyst of the spinal canal. CASTELLANI and ACANTORA (p. 254) describe a patient dying with massive cysticercosis of the brain heart and skin and refer to iatrogenic pseudocysticercosis.

VILJOEN (p. 254) discusses the frequency of cysticercosis in cattle and pigs in South Africa and the commonest site of infection in the muscles. He considers that freezing at -10°C . for 14 days is enough to ensure the safety of lightly infected carcasses, however fat. He recommends treatment in man and close inspection of abattoirs for the eradication of the disease.

ROY (p. 255) records the twelfth human infection with *Bertiella studeri*. C II

TOTTERMAN (Gundö) Ueber die Pathogenese der Wurmanämie [The Pathogenesis of Worm [Diphyllobothrium] Anaemia].—*Acta Med. Scandinavica* 1933. Vol. 98. No 2-4 pp 268-286. With 15 figs. [21 refs.]

The author's explanation of his findings is that the alcohol-soluble components of the worm may produce hypersensitiveness, a belief

favoured by the smallness of the doses used and by the failure of a second infection to cause anaemia and that the mechanism of production of the antipernicious factor is weakened so that this affection may supervene.

To nine patients with a history of anaemia from *Diphyllobothrium* infection there was given daily by mouth for 2 to 4 weeks 0.3 gram of dried worm or the corresponding dose of an alcoholic extract. In five of them the number of red cells fell sharply to as little as a million but the haemoglobin did not fall or did so but slightly (accordingly there was a rise in the colour index) but immediately on ceasing the administration of tapeworm substance the blood condition began to improve returning to normal in a few weeks when one of those reacting positively became infected with the tapeworm there followed a deterioration similar to that in this investigation there was no great alteration in white cells. The residue of the powder after extraction with alcohol had no effect on the blood. Of the other four patients two reacted to worm extract slightly two not at all. There was no reaction to the worm preparation in three persons with a normal blood picture and in three with cryptogenetic pernicious anaemia. A serological test showed that those with a history of worm anaemia and those with the pernicious anaemia seemed to react more often than the others by the formation of an antibody.

Claydon Lane

SIEVERS (Olof) Serologische Prüfungen der Sera von *Bothriocephalus* latius Trägern. [Investigations on the Sera of Carriers of *D. latum*].—*Acta Med Scandinavica* 1938 Vol. 96 No 2-4 pp 289-303 With 4 diagrams. [17 refs.] [English summary *Acta Med Scandinavica* 1938 Supp 89 pp 151-152]

Previous investigations have revealed that the precipitation as well as the complement fixation reaction may give positive outcomes with sera from carriers of the broad tape worm. Examined control sera have also given partly positive results and we have at least so far been unable to obtain any reaction of diagnostic importance. The character of the positive outcomes has been generally considered as non-specific. Animal tests however show that exceedingly specific worm immune sera may be acquired by injection of worm substance (into rabbits).

Dr G TÖTTERMAN has kindly placed at my disposal the cases related by him at this Congress and it seemed to me of interest from a general serological point of view to observe to what extent the blood of these patients, immunized with worm per os, contained worm antibodies. All the sera were tested with the complement fixation reaction worm powder as well as alcohol extract of worm powder being used as antigen. Sera were obtained several times from each patient during the course of treatment.

The results demonstrate that worm antibodies ensued in some cases, after administration per os of worm substance or alcohol extract of worm powder in persons who had suffered previously from bothriocephalus anemia. Positive outcomes were with but one exception, always obtained with the alcohol extract and sometimes also simultaneously with worm powder as antigen. The Wasserman test was carried out in each examination and always with negative result. The antibodies proved by me in these serological investigations sometimes appeared after administration of worm powder and sometimes after alcohol extract had been given but, in the examinations so far made never after administration of the residue left after alcohol extraction. The period of positivity was always very brief and there was no connection between the occurrence of antibodies and the symptoms indicating commencing anemia, at any rate not in this

material. Antibodies were not provable in sera from two control cases (non-bothrocephalus carriers) but they were present in some sera from persons with pernicious anemia.

"With a view to the present stage of these investigations one must be content with stating that worm antibodies may obviously ensue in the human organism on immunization per os and that patients who had suffered previously from bothrocephalus anemia and partly those also who had had pernicious anemia reacted more readily C L.

VON BOESDORFF (Bertel) Wird der antianämische Faktor in Leberpräparaten von *Bothrocephalus latus* zerstört? [Is the Anti-Anemia Factor in Liver Preparations destroyed by D. latum?—*Acta Med Scandinavica* 1938 Supp 89 pp 153-156]

MUELLER (Justus F) Studies on *Sparganum mansonioides* and *Sparganum proliferum*—*Annul II Trop Med* 1938. May Vol 18 No 3 pp 303-328 [With 18 figs. on 4 plates. [10 refs]

A continuation of observations already reported (this Bulletin 1938 Vol 35 p 687)

When *S. mansonioides* is swallowed by various hosts in which it does not become adult it penetrates the wall of the intestine reaches muscle and continues to grow. Because it travels for some distance laterally under the peritoneum before piercing it the intestinal contents do not escape into the peritoneal cavity. The adult taken from the cat and transplanted into tissues of the mouse lives and grows for about 3 weeks. The rhesus monkey will harbour plerocercoids to the number of 600 and will develop a condition of gelatinous swelling in the lower part of the trunk due to burrowing and disintegration of spargana in subcutaneous tissue. If however the monkeys have had injections of tapeworm substance this swelling does not occur for the parasites are promptly encapsuled. In various hosts the infection by sparganum leads to a persistent eosinophilia of 15 to 35 per cent while cats carrying the strobile show it apparently temporarily to about 8 per cent. A restudy of *S. proliferum* from Stiles's material shows no true scolex a confused arrangement of muscle fibres, excretory canals and nerve cords, so it is concluded that the form is an aberrant type of the sparganum of some other species perhaps of *S. mansonioides* since one or the other exists where *S. proliferum* has been reported. C L.

CORNET (Emmanuel) Note sur une nouvelle méthode de traitement de la sparganose oculaire. [A New Method of Treatment of Ocular Sparganosis.]—*Rev Méd Française d'Extrême-Orient* 1938. Feb Vol 18 No. 2 pp. 151-153 [17 refs]

Cornet is not enthusiastic about the treatment of ocular sparganosis by intravenous injections of novarsenobenzol as described by KELLER [this Bulletin 1938, Vol 35 p 223]

As contrasted with surgical intervention intravenous treatment is tedious, as Keller reports, needing 5 to 9 months in certain cases. Surgical treatment if the sparganum is palpebral, sub-conjunctival or cutaneous is rapid and sure whereas in retrobulbar infection local injection of alcohol or attraction of the parasite to superficial sites by

applied heat may be used. Acute inflammation means bacterial infection and for certain diagnosis a cut with a knife discloses a tunnelled fibrous mass

C L

WANG (Lo-shan) Human Infection of *Hymenolepis nana* in North China. An Analysis of 171 Cases.—*Chinese Med J* 1938 Aug Vol 54 No 2 pp 141-150 [13 refs.]

Of 51 856 patients examined usually by three fresh faecal smears at the Peking Union Medical College Hospital between 1926 and 1937 infection with *H. nana* was found in 171 (0.33 per cent) records being complete in 164

Of these last this infection was detected as the sole one in 52 and as accompanied by other parasites in 112 these other parasites being protozoa only in 36 helminths only in 42 and both sorts in 34 The ages of those infected by *H. nana* ranged from 80 days to 70 years, it being commonest among those of 25 years It was not possible to prove that symptoms shown by these patients were due to this infection Eosinophilia was as high as 5 per cent in those who had other parasites as well but was usually below this

C L

BACIGALUPO (J) & AGUIRRE PEQUENO (E) Un nouveau cas d'*Hymenolepis diminuta* chez l'homme au Mexique. [*H. diminuta* in Man in Mexico a Fresh Case]—*Bull Soc Path Exot* 1938 June 8 Vol 31 No 6 pp 502-504

A second case of this infection from Mexico is reported in man One to two cysticerci were discovered in 0.88 per cent. of female *Xenopsylla cheopis* examined.

C L

BARNETT (Louis) Hydatid Disease Incidence in New Zealand.—*New Zealand Med J* 1938 Aug Vol 37 No 200 pp 188-192.

The incidence of hydatid infection in Australia and New Zealand together with deaths (in brackets) during 1937 were as follows Totals 1,226 (143) liver 770 (102) lungs 236 (15) muscles and fascia 57 (2) kidney 32 (6) bones 32 (4) brain 12 (3) While the totals for Australia and New Zealand were respectively 611 (65) and 615 (78) the corresponding figures for liver were 425 (50) and 345 (52) and for lungs 94 (5) and 142 (10)

C L

MARANGOS (G) Beitrag zum familiären Auftreten der Echinokokkenkrankheit [A Familial Outbreak of Hydatid Infection.]—*Munch Med Woch* 1938 June 3 Vol. 85 No 22 pp 830-833 With 3 figs.

Father mother and four children fugitives from Asia Minor were treated in the Red Cross Hospital Athens for hydatid disease After operation on the liver four died In one of the two survivors X-rays showed extensive cysts in the lungs.

C L

COUTELEN (F) Sur la structure de la membrane prolifère des hydatides échinococciques. [The Structure of the Germinal Layer of Hydatid Cysts.]—*C R Soc Biol* 1938. Vol. 128. No 23 pp 946-948.

A preliminary report of further work (see also this *Bulletin* 1932, Vol. 29 p 53) on the structure of the germinal layer of hydatid cysts. A detailed illustrated report will be published. C L.

FRIEDRICH (H) Die Diagnose des Echinococcus alveolaris (infiltrierend wachsender Echinokokkus) keine extrem seltene sondern fast immer verkannte Erkrankung [The Diagnosis of Echinococcus alveolaris (that growing by Infiltration) not a Rare Illness but One nearly always missed.]—*Med Klin* 1938. Sept. 16. Vol. 34 No 37 pp 1220-1222

Friedrich has seen in 4½ years ten histologically confirmed cases and holds that every doctor must always have in mind the possibility of Echinococcus alveolaris in a patient who shows a painful wasting malignant swelling that does not behave as a true malignant tumour. As an aid to diagnosis of 7 cases which have been X-rayed, there have been in 5 fine points of calcification which allow of a true diagnosis.

C L.

LEELE (Charles J) Pulmonary Echinococcosis.—*Amer Jl Dis Children* 1938 June Vol 55 No 6 pp 1257-1272. With 4 figs

An American born boy of seven had a hydatid cyst in each lung. One was punctured with escape of typical fluid without hooklets. An intradermal test was then positive for hydatid with eosinophilia from 4 to 21 per cent. puncture was followed by much toxicity high fever meningismus and pneumothorax for which decompression had to be done. The other cyst seemed to be increasing the patient died of a perforated gangrenous appendix and autopsy was refused.

C L.

STEVENSON (Douglas Stuart) & HEGGIE (James Ferguson) Echinococcus Disease Hydatid Cysts in Lung and in Liver.—*Glasgow Med Jl* 1938 July Vol 12. No. 1 pp 25-28 With 6 figs. on 3 plates.

Two cases were treated in Glasgow. One had two pulmonary cysts, of which one was punctured with recovery of brood capsules, and the second burst into the air passages with expectoration of hydatid cyst wall and pus. In the second a cyst was discovered in the quadrate lobe of the liver after death from decompensated cardio-renal disease.

C L.

HARE (Clarence C) Cysticercus cellulosus of the Brain. Report of Two Autopsies.—*Jl Amer Med Assoc.* 1938. Aug 6. Vol. 111 No. 6. pp 510-515. With 6 figs.

In one of these cases there had been operations on two cysts in the brain. Autopsy revealed a number more widely disseminated and degenerating. The illness started with epileptiform fits and ended in

mental changes. In the second epileptiform fits had occurred for 20 years. In both there was hydrocephalus and reticulo-endothelial activity in the walls of cyst cavities. C L

DE SÈZE (S) LAPLANE (L.) & FIMBEL (M) Cysticercose opto-chiasmatique [Cysticercosis of the Optic Chiasma].—*Bull et Mém Soc Méd Hôpît de Paris* 1938 July 11 54th Year 3rd Ser No 24 pp 1202-1206

Excess of lymphocytes precipitation of colloidal benzoin in the first 10 or 12 tubes and local eosinophilia in the cerebrospinal fluid occurring in the absence of a Wassermann reaction give a certain diagnosis of cerebrospinal cysticercosis

The history is given of a woman with temporal hemianopsia of the right eye with headache loss of the power to distinguish scents with a constant bad smell in her nose pain in the sacrolumbar region with the right patellar reflex nearly absent and the left one active Cysticercus cysts in the lower part of the spinal canal and about the optic chiasma were diagnosed. Those about the optic chiasma were exposed and removed with some improvement in vision before she was lost sight of C L

[The authors lay stress on the colloidal benzoin reaction and its use in the diagnosis of cerebrospinal cysticercosis. The reagents are made up as follows (1) One gram of freshly powdered Sumatra gum benzoin is dissolved in 10 cc absolute alcohol This is well shaken and left to stand for 48 hours. It is then decanted and 0.3 cc. of the clear fluid slowly added to 20 cc of twice distilled water at 35°C A homogeneous suspension is thus obtained which must be freshly prepared for use (2) A 0.01 per cent. solution of chemically pure sodium chloride in water twice distilled through a glass condenser

For each cerebrospinal fluid to be examined a series of tubes is put up Into the first is placed 0.25 cc. and into each of the remainder 1 cc of the salt solution Into the first is measured 0.75 cc. of the cerebrospinal fluid into the second 1 cc After mixing 1 cc. is removed from the second and placed in the third tube and so on except that the last tube does not receive any C.S.F. acting as a saline control. To each tube is now added 1 cc of the gum benzoin suspension and mixed. Readings should be made after 12 hours at laboratory temperature Three degrees of precipitation are recognized 0 where no change takes place 2 where complete precipitation with clear supernatant fluid occurs and 1 intermediate (BRAXTON HICKS & PEARCE *Brit Med J* 1924 Feb 16 p 263)

GUILLAIN PÉRON & THÉVENARD (*C R Soc Biol* 1926 Vol 95 p 455) give readings in cerebrospinal cysticercosis of 1222122222100000 and 1222222222210000 In conjunction with excess of albumin, positive Pandy reaction lymphocytes numbering from about 76 to 312 per cmm. and negative Wassermann reaction a colloidal benzoin reaction positive in the first 10 to 12 tubes indicates the diagnosis of cerebrospinal cysticercosis—Ed]

ROGERS (J S Y) & TUDHOPE (G R.) Hydatid Cyst of the Spinal Canal successfully treated by Operation.—*Arch Dis in Childhood* 1938, Sept. Vol. 13 No 75 pp 269-274 With 3 figs. [16 refs.]

the case serves as a reminder that the site of election of hydatid cysts in the spinal canal, extradurally and on the posterior surface of the

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cord, facilitates operative removal, and that the results of operation are frequently most favourable.

The child of 9 had paresis and paraesthesia of the lower limbs and lipiodol showed spinal blockage at the level of the first lumbar vertebra. A cyst easily shelled out measured $2 \times \frac{1}{2}$ inch and when opened displayed hydatid hooklets. She completely recovered movements and lipiodol passed to the lower end of the spinal canal.

C L

CASTELLANI (Aldo) & ACANFORA (G) Brief Notes on Cysticercosis and Læstic Pseudocysticercosis.—*J Trop Med & Hyg* 1938. July 1 Vol. 41 No 13 PP 213-217 With 8 figs.

A general consideration of these two conditions with illustrative cases.

The ten year-old daughter of a Calabrian pig breeder ate pork, often underdone daily. Fever, headache, and exophthalmos were in her history, there was eosinophilia of 30 per cent, trichuris eggs in her stool, and a negative Wassermann reaction and many small nodules over the skin mostly as large as a pea, but varying from the size of a rice grain to that of a cherry. She became epileptic, cyanotic and developed tachycardia dying in her third epileptic attack. The cysts were cysticerci and photographs of the heart and brain show massive infections.

The læstic condition is illustrated by the man already reported (this Bulletin 1938 Vol 35 p 225) with the additional information that some nodules reappeared in March 1938 and disappeared under neosarphenamine bismuth treatment. The Wassermann reaction at the time of retreatment is not noted.

VILJOEN (Noel Francois) Cysticercosis in Swine and Bovines, with Special Reference to South African Conditions.—*Onderstepoort J Vet Sci & Animal Industry* 1937 Oct. Vol 9 No 2. pp. 337-370 With 4 charts, 2 maps & 17 figs. [14 pages of refs.]

C L

This exhaustive treatise (its digestion would have been quickened by a table of contents) takes the history of pork measles back to BC 424 when ARISTOPHANES mentioned the custom of examining pigs' tongues for glandular tumours through LEUCKART'S infection of a calf by feeding it on *Taenia saginata* to a survey of cysticercosis in swine and cattle in most countries of the world. The information regarding the last is got not only from the literature but also from replies to questions which were addressed by the author to many authorities in many places and which constitute a valuable record. As to Union abattoirs the discovered percentage of *C. cellulosae* varied from 0.5 at Hellbron North to 25.07 at Senekal and that of *C. bovis* from 0.08 at Altwal to 7.29 at Port Elizabeth. The commonest seat of infection in 30 pig carcasses minutely dissected was the muscles above the elbow (triceps etc.) and the only instances in which measles were not found there were two animals in which less than 10 measles in all were found. The means of spread in the Union will be understood from the following two examples. There is the instance of a farmer and his household who used the rear of a quince hedge close to the homestead because compared with a stinking, fly infested privy it was far cleaner thanks to the pigs which can be trained to come at a whistle. Then there was

that of three farmers amongst the foremost in the Union with pigs scrupulously styed. When measles were found in their pigs their faith in the life-history of the worm as told them was shaken till on Viljoen's advice they watched their native staff—two of them then reported enthusiastically that each had seen one of these men easing himself in the sty and in one case the culprit had a tapeworm. Enquiries as to the farmers' attitude to the culprits were not pressed. These illustrations justify the advice that insurance schemes for farmers which include indemnification for measles found at abattoirs in carcasses of their stock should be abolished since they encourage carelessness.

C. botis in 25 carcasses of oxen was found in largest numbers and in all animals in the hind limbs and about the shoulder and elbow—it was least common in the diaphragm—in lightly infected beasts the cysts were most frequently found in the masticatory muscles.

As judged by the evagination of the scolex of *Cysticercus* swallowed in a bag or celluloid case which was then recovered from the faeces *C. cellulosae* which had been first frozen for 5 days was not viable. For safety it is felt that a not too fat pig carcass frozen at -10°C for 7 days is safe and that from the public health point of view a lightly infected carcass however fat kept at this temperature for 14 days was so. For *C. botis* 6 days continuous freezing of the carcass is held to be enough. Here as elsewhere in the paper the literature is summarized (the extent of the references shows how fully) in addition to the author's own experience in animals and that of his correspondents in animals and man. His recommendations for sorely needed eradication are necessarily divided between the elimination of the strobile in man including free treatment and rewards for heads (but would not some of the class of person here described make themselves rich as self-breeders of tapeworms at 2/6 a scolex?) and close inspection of abattoirs.

C L

ROY (Sudhir Chandra) *Bertiella studeri* a Natural Tape-Worm Parasite of Monkeys, in a Hindu Child.—*Indian Med Gaz* 1938 June Vol. 73 No 6 p 346

The twelfth case reported from man

The segments were passed by a Brahmin boy of eight living in Bengal. They were identified by P. A. MAPLESTONE C I

MALARIA.

PRÉCIS OF ABSTRACTS IN THIS SECTION

RUSSELL (p. 256) discusses the quinine supplies in India.

RICHARD (p. 257) found in dogs that quinine may produce disturbance of co-ordination through a reflex labyrinthine mechanism.

GORBITZ (p. 257) lays stress on the toxicity of quinine and prefers atabrin as a schizonticide. Plasmoquine has little toxicity in the small doses now recognized as sufficient.

GENTEKOW and CALLENDER (p. 257) detail the treatments given to the Panama Canal Department of the United States Army. These cannot be further summarized. Quinine in the large and long continued doses given is rather more effective than atabrin in preventing relapses in *vivax* infections and markedly so in *falciparum*. Plasmoquine has a pronounced effect in reducing the relapse rate. SIEGENRECK (p. 258) shows that atabrin is more effective than quinine in tertian malaria but points out that toxic effects occur after atabrin injections. KKKHCHER (p. 258) has found acridine to be efficient and well tolerated. DZORKTSEVA (p. 259) as a result of experiments on rabbits found that the combination of plasmoquine and acridine in the proportion of 1 to 3 is less toxic than either drug given alone. MACLAHOV (p. 259) finds that a treatment of quinine and plasmoquine compound followed by atabrin and plasmoquine compound (given simultaneously) gives better results than any other form of treatment in Trinidad, where the infections are chiefly subtertian.

FAGET PALMER and SHERWOOD (p. 260) report unfavourably on the sulphamamide treatment of two patients with *vivax* one with *falciparum* and one with malarial infection. YOOKHOEVE (p. 260) found good results in the treatment of malarial splenomegaly by intramuscular injection of iodinequinine, a mixture of quinine, adrenalin iodine and glycerol. RONCEO (p. 261) treated three patients successfully by the Ascoli method.

HILL and GOODWIN (p. 261) found that atabrin grains 1½ three times weekly gave good results in the prophylaxis of malaria in Georgia where mosquito control was impossible. MELIA ADAMIAN (p. 262) considers that prophylactic treatment with acridine should be reserved for those who have suffered from malaria the previous year. He records his results. FARTOVICH and LENTTI (p. 262) report that after a course of treatment with manganese iodomercurate 17 of 21 non-immune patients were refractory to *vivax* infection when a period of 45 days or more was allowed to elapse between the treatment and the bites by infected mosquitoes. KALMUS and KOSTIC (p. 263) in Jugoslavia found that 26 per cent. of 106 patients treated with quinine sulphate alone and 8.8 per cent. of 162 treated with plasmoquine showed a first relapse. Subsequent relapses occurred in 6.6 per cent. in the quinine and 0.62 per cent. in the plasmoquine series. C IV

RUSSELL (A. J. H.) La distribution de la quinine dans l'Inde. [Distribution of Quinine in India.]—*Bull. Office International d'Hyg. Publique* 1938 July Vol. 30 No. 7 PP 1566-1568.

The question of quinine supplies in India was treated more fully by the same author in the December 1937 issue of the Records of the Malaria Survey of India (see this *Bulletin* 1938 Vol. 33 p. 418).

The amount of quinine distributed by public health and medical agencies in 1935 in British India amounted to 0.06 gm. per head of population and of cinchona febrifuge to 0.43 gm per head. [The latter figure is erroneously printed as 0.06 gm] *Norman White*

RICHARD (Abel) Etude du mécanisme d'action de la quinine sur le système nerveux. [Mechanism of the Action of Quinine on the Nervous System.]—*C R Soc Biol* 1938 Vol. 127 No 13 pp 1232-1234

Experiments on dogs which are described lead to the conclusion that quinine is not toxic to the nerve centres has no direct action on the psychomotor centres and that the disturbance of co-ordination that quinine may produce is attributable to a reflex labyrinthine mechanism. *A II*

GORBITZ (Guillermo) Tolerancia de los medicamentos antipalúdicos [Toleration of Anti-Malaria Drugs.]—*Crónica Méd Luma* 1938 Jan Vol. 55 No 895 pp 22-31

This paper which starts with a list of anti malaria remedies is chiefly concerned with the pharmacology of quinine atabrin and plasmoquine with special attention to the toxic symptoms attributable to each. The toxicity of quinine for protoplasm is made much of. A very complete study of the literature concerning unfortunate sequelae to the administration of quinine has been made and the impression conveyed by a perusal of the four pages devoted to this topic is that quinine is a dangerous drug. The author reaches the conclusion that on all counts atabrin as a schizonticide is much to be preferred to quinine. It is much better tolerated by the organism than is quinine and produces fewer and less important subjective symptoms. Plasmoquine the only elective gametocide has but little toxicity given alone in the small doses now recognized as sufficient. *A II*

GENTZKOW (Cleon J) & CALLENDER (George R.) Malaria in the Panama Canal Department, United States Army II. Results of Treatment with Quinine, Atabrine and Plasmochin.—*Amer J Hyg* 1938 Sept Vol 28. No 2. pp 174-189

For the past few years the Panama Canal Department of the United States Army has had an average troop strength of about 13 000 with a malaria rate of approximately 40 per thousand per annum. The results of treatment of cases occurring in a population under continued careful observation and control cannot lack interest. Cases were treated in the different station hospitals or at the Gorgas or Colon Hospital. The treatment given in these different institutions was not uniform in fact many types of treatment have been used. In general it may be said that the doses given are largely in excess of those usually given at the present time. Before the use of atabrin the more or less standardized quinine treatment consisted of 1 gram of quinine in solution three times a day while in hospital followed after discharge by 1 gm. a day for 90 days. Atabrin when first used was given in doses of 0.1 gm. three times a day for five days the period was afterwards prolonged to seven and then to nine days or even

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longer if parasites persisted. Early in 1935 the atebirin treatment was standardized to a certain extent 0.2 gm. three times a day for the first day 0.1 gm. three times a day for the subsequent six days. In some hospitals this treatment was reinforced with plasmoquine 0.01 gm. three times a day on the third, fourth or fifth days, in the treatment of all types of malaria. At some hospitals the plasmoquine in these doses was given after the atebirin treatment. At the Colon Hospital atebirin 0.6 gm. was given in a single dose, daily for four days followed by plasmoquine 0.01 gm. three times a day for three days. This dosage was quite satisfactory but the dose of atebirin has recently been reduced to 0.4 gm. As a follow-up treatment 0.2 gm. atebirin is given daily for seven days a month after the previous attack.

The number of cases on which this report is based is 1696. Of 967 *vexer* cases 22.9 per cent relapsed of 683 *falciparum* infections 5 per cent relapsed of 48 *malariae* cases 2.2 per cent relapsed. Most relapses 83 per cent of the *vexer* and 97 per cent of the *falciparum* cases, occurred within six months of the preceding attack.

The following conclusions are drawn. Atebirin alone has failed to prevent relapses to a greater extent than any other of the treatments tried. Quinine in the large and long continued doses mentioned above is somewhat more effective in preventing relapse in *vexer* infections than is atebirin and markedly so in *falciparum* infections. Plasmoquine given concurrently with or following atebirin has a pronounced effect upon the relapse rate in all types of malaria this effect was specially noteworthy in the *vexer* cases.

SIEGENBEEK VAN HEUKELOM (A.) & OVERBEEK (J. G.) Behandeling van de acute malaria-anaal met atebirin pro injectie. Tweede mededeeling. [Treatment of Acute Malaria with Atebirin Injections.]—*Groenak Tijdschr v Nederl Indis* 1938 July 12. Vol. 78, No. 28, pp 1633-1633 With 3 figs. [47 refs.] English summary.

Of 875 cases of malaria treated in hospital in Batavia 518 were *falciparum* infections and 111 *falciparum* combined with *vexer*. The case mortality rate was high 7.5 per cent. in subtertian, 2.5 in tertian and 2.7 per cent in combined subtertian and tertian. Intramuscular atebirin injections were given to 634 of these patients. Two injections of 300 mgm. were insufficient to prevent subtertian relapses. Atebirin by mouth 300 mgm. a day for three consecutive days, starting five days after the last injection, was accordingly given to 410 patients, with the result that the relapse rate was only 4.4 per cent as compared with 16.2 per cent among those patients treated by atebirin injections alone. These are minimum figures as it was not possible to follow up all patients discharged from hospital. In uncomplicated subtertian fever treated by atebirin injections the temperature fell to normal within two days in 89 per cent as compared with 75 per cent. in a comparable series of cases submitted to a short course of quinine by mouth. Well-nourished Europeans and Japanese could generally tolerate three or four injections of atebirin if these were given at intervals of not less than 24 hours. In patients with jaundice or with damaged livers atebirin should be given with caution. A badly-nourished native infected with *P. malariae* developed jaundice the day following an atebirin injection and died five days later with acute

atrophy of the liver. No case of cerebral excitation following atebryn treatment was observed. Intoxication occurs with greater frequency after the intramuscular injection of atebryn than after the oral administration of the drug in tertian fevers the oral administration is to be preferred. Atebrin is more effective than quinine in the treatment of tertian malaria in so far as the prevention of relapse is concerned. In severe subtertian cases that are kept under observation the advantages of atebryn injections outweigh the attendant danger of drug intoxication. Atebrin injections are not suitable for mass treatment.

N II

AEKICHER (O M) Epreuve de l'acriquine comme moyen anti paludique sur le terrain [Value of Acriquine as an Antimalarial Remedy in the Field].—*Med Parasit & Parasitic Dis* Moscow 1938 Vol. 7 No 2 [In Russian pp 155-177 French summary p 177]

The author has found acriquine to be well adapted to use in the field in the treatment of tertian fever with acriquine schizonts and gametocytes alike disappear from the blood in from three to four days. The percentage of early relapses after the treatment was 25.9. Health is rapidly re-established under the treatment and the drug is well tolerated. Symptoms of intolerance are few and insignificant. Yellow discolouration of the skin is more frequent among women and children than among men. Three courses of treatment prolong the intervals between relapses by not less than two months.

N II

DOZORTSEVA (P M) Sur la toxicologie et la pharmacologie du composé de la plasmocide et de l'acriquine [Toxicology and Pharmacology of Plasmocide and Acriquine Compound].—*Med Parasit & Parasitic Dis* 1938 Vol 7 No 2. [In Russian pp 197-206 With 21 figs. French summary p 207]

The author considers the results hitherto obtained in this inquiry as provisional only but the following conclusions are justified. The combination of plasmocide and acriquine in the proportion of 1:3 diminishes one of the most serious symptoms ascribable to the administration of plasmocide alone namely its spasmodic action on the vascular system of the isolated ear and of the kidney of the rabbit. It also lessens the toxic action that both plasmocide and acriquine exercise singly on the cardiac activity of both cold and warm blooded animals. Respiration does not appear to be depressed occasionally it is stimulated. Blood pressure is temporarily lowered but there is no weakening of the heart's action. Peristalsis of the isolated rabbit's intestine is weakened but the rhythm of isolated contractions is not slowed. Comparative experiments show that rabbits tolerate better the intravenous injection of the two drugs combined than the injection of acriquine alone. These intravenous experiments indicate the possibility that the proportion of acriquine in the combination might be increased.

N II

MACMAHON (Ryan) Treatment of Malaria. [Correspondence].—*Brit Med J* 1938 Sept. 24 p 681

In an article on the treatment of Malaria the British Medical Journal reproduced a statement of the Malaria Commission of the League of

MELIK-ADAMIAN (S. S.) Essai de l'emploi de l'acriquine en masse pour le traitement des enfants paludéens. [Acridine in the Mass Treatment of Malarious Children.]—*Med. Parasit. & Parasitic Dis. Moscow* 1938. Vol. 7 No. 2 [In Russian pp. 178-191 [55 refs.] French summary p. 191]

School-children to the number of 2 031 who had suffered from malaria the previous year were treated with acridine in April 1935. During the subsequent 13 months the percentage of relapses was only 11.5. Ordinarily there is a spring wave of relapses in the malaria curve. Of the relapses that did occur 60 per cent. were experienced in May and June 1935 they became less and less frequent as the year advanced and in the following spring 1936 their number was negligible 0.6 per cent. in April and 1.3 per cent. in May. No prophylactic administration of acridine was given to them in 1936. The treatment of acute cases of malaria among children of pre-school age with acridine was followed by a relapse rate of only 26 to 30 per cent. during a prolonged period of observation.

The author considers that prophylactic treatment with acridine ought to be reserved for those who have suffered from malaria the previous year. Periodic examination of the blood, especially during the epidemic season, with a view to identifying parasite carriers among those who suffered the previous year and the systematic treatment of such carriers, are important anti-malaria measures; they were of great assistance in improving the health of the community that was under observation.

N 17

FATTOVICH (Giovanni) & LENTI (Pietro.) Ricerche sperimentali sull'azione profilattica dello iodomercurato di manganese verso l'infezione malarica umana inoculata da zanzara. [Experimental Investigation of the Prophylactic Value of Manganese Iodo-mercurate in Malaria.]—*Arch. Ital. Sci. Med. Colon. & Parasit.* 1938. Mar. Vol. 19 No. 3 pp. 129-160. With 7 graphs. [51 refs.]

The observations recorded were made in three widely separated psychiatry institutions in Italy and had as their object the determination of the value of mercury in combination with manganese in the form of an iodate in association with spleen extract in the prevention of malaria. The patients were selected with due regard to past history only those who were unlikely to have any acquired immunity to malaria being used. These were submitted to a month's treatment, in one institution in January in the second in April and in the third in August. The drug was given in pill form, each pill containing manganese iodomercurate 0.011 gm. and spleen extract 0.05 gm. The commencing dose was one pill every second day; this was gradually increased to eight pills a day at the end of treatment. The drug was given in the morning on an empty stomach. There were no signs of drug intolerance and the general health of most patients was improved by the treatment. Increased haemoglobin, increased red cells and an increase in the leucocyte count were commonly noted.

At varying intervals after the completion of this medication the patients were bitten by anophelines infected with *P. vivax*. Controls

demonstrated the adequate infectivity of the batches of anophelines used. If an interval of not less than 50 days had elapsed since the end of treatment a very well marked resistance to infection was noted. Still better results are obtained if the interval be increased to two months or more. This refractoriness was shown by 5 of 7 patients at Imola inoculated 45 days after treatment and by all of three inoculated four months after treatment. In Venice 9 of 11 inoculated two months after treatment resisted infection.

The authors conclude that this mercury manganese preparation in association with spleen extract unlike quinine and synthetic malaria remedies has a real prophylactic action in malaria possibly brought about by an exaltation of the powers of resistance that the reticulo-endothelial system normally possesses. [See also this *Bulletin* 1938 Vol 35 p 31.] A II

KALMUS (H) & KOSTIĆ (D Y) Ueber die Herabsetzung der Zahl der Tropicarexidive durch Plasmochin [Reduction of the Number of Relapses in Malignant Tertian Malaria by Plasmoquine]—*Arch f Schiffs u Trop Hyg* 1938 Nov Vol 42, No 11 pp 501-502

The authors made a study of the records of the malaria dispensary of the hygienic institute in Skopje Yugoslavia. Case records for the year 1937 numbering 8700 were carefully investigated. Children under 1 year of age and cases of pregnancy being excluded. Plasmoquine was almost exclusively administered to patients in whose blood *Plasmodium falciparum* was found. Analogous cases of the same infection treated with quinine sulphate alone were used for comparison. Quinine sulphate was given in doses of 0.5 gm. twice daily till 5 to 6 gm. had been administered in all. The plasmoquine was administered in two methods: (1) As quinoplasmoquine namely 15 tablets one tablet thrice daily for 5 days each tablet containing 0.01 gm plasmoquine and 0.3 quinine. (2) As plasmoquine co. after a four-day period of quinine administration (0.5 gm. twice daily) one tablet containing 0.01 gm plasmoquine and 0.125 gm quinine sulphate was given thrice daily for a further period of five days. Since in Macedonia the risk of infection with malignant tertian malaria does not exist from the middle of October to the beginning of May the cases occurring during this period were regarded as relapses which after the completion of the above treatment gave a positive blood result.

The action of plasmoquine in reducing the number of relapses is seen in the following table —

Mode of treatment	Quinine sulph	Quin + plasmo- quine co	Quino- plasmoquine
Total cases	199	57	105
1st relapse	51	4	7
2nd relapse	8	0	1
3rd relapse	4	0	0
4th relapse	0	0	0
5th relapse	1	0	0

These cases were extracted from the 8,700 case records. Expressed in percentages, 28.0 per cent. had a first relapse after quinine treatment only and 6.8 per cent. after plasmoquine treatment. Subsequent relapses occurred in 6.6 per cent. in the quinine and 0.62 per cent. in the plasmoquine series. The authors consider that the results are fairly free from fallacies.

E D IV Graig

REVIEWS AND NOTICES

WORTHINGTON (E. B.) [M.A. Ph.D. (Cantab) Director of the Freshwater Biological Association of the British Empire formerly Demonstrator in Zoology at Cambridge University] Science in Africa. A Review of Scientific Research relating to Tropical and Southern Africa. Issued by the Committee of the African Research Survey under the Auspices of the Royal Institute of International Affairs—pp xiii+746 With 5 maps (1 coloured folding) & 8 plates 1938 London New York Toronto Humphrey Milford Oxford University Press 10s 6d]

This is a great achievement. The author has collected an enormous mass of detailed information put it together skilfully and presented it in a readable and entertaining form. The constituent chapters might have been written each by a specialist in the subject dealt with under one editor in chief but thereby the book would lose much of its charm and interest and become a collection of special reports or monographs whereas we have here the broad view of one who has studied so far as it is possible for one individual the many sides of the comprehensive subject of Science in Africa and the author visualizes the inter relation of the various problems which present themselves in a way which separate specialist accounts could never do.

Merely enumeration of some of the chapters will show the extent and depth of observation required. For one man to write on the geology the meteorology forestry (including under this forest reserves destruction of forest and its results) zoology game and game-preservation entomology (with accounts of disease vectors—tsetse mosquitoes ticks and fleas—insect pests and termites) agriculture health problems and the chief diseases of man and stock and anthropology and to do all this intelligently without padding betokens powers of observation and width of outlook possessed by few.

The chapters which most concern readers of this *Bulletin* are the three devoted to *Health and Medicine* on general lines to *Human Diseases* in more detail and to *Health and Population* these together make up more than one-fifth of the entire book. In the first of these the author mentions the present organizations international and special as regards individual Governments Colonies and Protectorates the arrangements made for dealing with disease and the prevention of it child welfare work and social assistance generally and of the utmost importance the medical education of Africans to undertake routine work under supervision for it is impracticable if not impossible to provide adequate medical attendance for millions of natives by practitioners with European qualifications. The training of nurses and midwives is another matter of the very highest importance and is hampered by the difficulty of finding native women of sufficient education to profit by the teaching.

In the chapter on *Human Diseases* the author groups these under four main categories—

1 Those due primarily to conditions of life and likely to disappear when the latter improve this group includes malaria and blackwater fever sleeping sickness and jungle yellow fever 2 Those due to unsanitary conditions such as bad housing water supply conservancy and so on such diseases as plague relapsing fever typhus tuberculosis leprosy helminthic infestations enteric infections and dysentery pneumonia and yaws It would appear to the reviewer that this is a

very arbitrary grouping several of the latter—tuberculosis plague typhus enteric, for example—being as much due to bad social conditions as malaria or even more so. 3 Diseases whose spread is largely due to ignorance such as the venereal infections. 4 Those due to or aetiologicaly associated with malnutrition. Readers will see that such a grouping would leave out some diseases and on the other hand several diseases might with equal right be placed under one or more of the groups.

This chapter gives also a survey of research work on malaria, yellow fever, trypanosomiasis and plague and of the work carried out to control leprosy.

The chapter on *Health and Population* points out the importance and value of vital statistics and demography and the regrettable but unavoidable lack of accurate data. In this chapter the question of food and nutrition is discussed and the closely connected question of the physiology and development of the African. The chapter ends with remarks on the health of Europeans and the vexed question of deterioration of it under tropical conditions and the means for preventing it.

The work is embellished by a few well chosen and well reproduced maps and illustrations and a full bibliography of 85 pages arranged according to the chapters to which the works named particularly apply so that anyone interested in any particular aspect of the subject knows where to seek for further information. Finally the author has given full acknowledgment to all who have helped him in providing information for this work which has the exception merit of being interesting to dip into and to have by one for reference. It is a mine of information.

H H S

MACCHIARELLO (Attilio) [D.M., Dr P H (Harvard) etc.] *Investigaciones sobre la bacteriología e inmunología del tifo exantemático*. [Studies on the Bacteriology and Immunology of Typhus.]—pp xx+222. With over 100 illustrations. [Bibliography] 1938. Santiago Soc Imp y Lito Universo Ahumada \$2.

The studies described and collected in this volume were carried out during a period of three years. The descriptions are so detailed, the methods and results so minutely given that the work becomes one of reference rather than a book to be read sequentially. The whole consists of four parts. The first dealing with bacteriology the second with immunology the third with serum treatment, preventive and curative and the fourth summarizing the conclusions and giving a bibliography of more than two hundred references. Appended are 36 photomicrographs, as clear as reproduced rickettsial photographs ever are.

In part I the author deals with cultivation of Rickettsia and discusses various factors entering into and influencing the culture—medium temperature, use of fresh or dead tissues—and the biological aspects of *R. prowazekii* in tissue culture—morphology staining colony formation filtrability virulence etc. A new method of staining is described. The following is the technique—

- Solution 1 Saturated solution of basic fuchsin in absolute alcohol
- Solution 2 Two per cent. thiocta in distilled water
- Solution 3 Buffer solution of monopotassium (1 per cent.) and disodium phosphate (25 per cent.) with pH 7.4-7.8
- Solution 4 0.8 per cent. citric acid.

From these are prepared —

- I 0.1 cc of solution 1 added to 25 cc of solution 3 and filtered
This is unstable
- II 25 cc of solution 4 are added to 75 cc. distilled water and 0.5 cc. of solution 2, and filtered. This keeps permanently

Procedure — Smears of culture or organs or exudate containing *Rickettsia* even and thin are stained for 3-5 minutes with the 0.25-1 per cent basic fuchsin in the buffer solution or distilled water the stain is filtered directly on to the slide. Decolorization is obtained by 2-3 seconds exposure to the citric acid solution (if longer the *Rickettsia* lose stain). Counter staining is done with carbol methylene blue diluted to 1 in 4 and allowed to act for 1-2 seconds.

The results as judged by coloured plates reproduced are very clear.

In part II vaccination against murine and the European types of typhus is discussed. The technique of Zinsser and Castañeda's vaccine is described the results of animal experimentation carried out with it and the possibility of preparing this vaccine in Chile is discussed. Analogously the manufacture and use of a culture vaccine for European typhus is considered. Employing Zinsser's technique and large flasks he is able to obtain a sufficient quantity of *Rickettsia*. It has proved effective in animal experiments with the guinea-pig and the author states that there is no danger of injecting the living virus and the product should be tested in man. There follow several protocols on the results of sero-vaccination of guinea-pigs against infection by the European type.

Part III as stated deals with preventive and curative therapy. In one table is a record of 70 contacts receiving the Harvard anti-murine serum prepared by ZINSSER and CASTAÑEDA and none of them contracted the disease. In the curative section a few cases only of the European type are recorded. The treatment appeared to shorten the fever lower the temperature and favourably influence the toxic and nervous symptoms but seemed not to affect the evolution of the physical signs present. The book is a valuable record of work meticulously performed.

H H S

MAJUMDAR (Abhil Ranjan) [MB Bengal Medical Service etc.] *Bed-Side Medicine. A Hand-Book of Medical Diagnosis Including Symptomatology, Physical Signs, Pathology, Treatment and Laboratory Methods, from Tropical Standpoint.* Fourth Edition.—pp. xii+939. With 259 text figs & 49 figs. on 26 plates. 1938. Calcutta. The Book Company Ltd. 4/4A College Square [8 Rupees 8 Annas.]

The aim of this book appears to be to describe in a single volume those facts of medicine clinical pathology and treatment which enable the student or practitioner to examine patients intelligently to arrive at an accurate diagnosis and to prescribe adequate and rational treatment. The author states that he has tried his utmost to keep the material within the confines of a handy volume which can be carried about in routine work and he is fully aware that this may have led to omissions. Some of these omissions are not without importance especially to the workers in the tropics. For example yellow fever is described as endemic in tropical America but no mention is made of its presence in Africa undulant fever is said to be centred in Malta and in India is sometimes seen in the Punjab among troops recently

arrived from the Mediterranean Coast, while there is no mention of species of *Brucella* other than *mediterranea* the virus of climatic bubo appears unaccepted Frel's test is ignored and scant attention is paid to the less obvious manifestations of the infection there is no recognition of the effect of sulphonamide drugs in *Bact coli* urinary infections or in gonorrhoea which disease does not even appear in the terminal index. The book has increased in volume but whether such an increase is inevitable is doubtful. Pages might have been saved by the suppression of statements which rest upon little foundation of experimental or practical experience. For example where is the evidence that in blackwater fever the actual process is one of lowered resistance of the red blood cells to the osmotic (sic) tension causing their rupture and haemolysis " and who would agree that organic arsenical drugs are specific curative agents for filarial disease?

Nevertheless, the fundamental excellence of the book has been favourably commented upon in previous reviews (see this *Bulletin* 1935 Vol. 32 p 464 and 1931 Vol. 28, p 336) and the early appearance of the fourth edition is sufficient indication of the value placed upon the work by its readers. The present edition, which is well illustrated by diagrams, photographs and illustrations, will probably prove equally popular particularly in India for which country it is especially designed.

F. Murgatroyd

TROPICAL DISEASES BULLETIN

Vol 36]

1939

[No 4

SUMMARY OF RECENT ABSTRACTS

III MALARIA *

[continued from p 192.]

Treatment

Quinine atabrin and plasmoquine

RUSSELL (p 418) discusses the requirements and production of quinine in India. COHEN KING and AINLEY (p 515) tested and report on the chemistry and activity of certain derivatives and analogues of cinchona alkaloids.

GUNTHER (p 102) in New Guinea regards quinine as much superior to any other drug in the treatment and prophylaxis of malaria. EJERCITO and SANTOS (p 31) found that quinine sulphate and Philippine totaquina gave similar results. MRYAHARA *et al* (p 419) found that the therapeutic value of euquinine in mass treatment was low. It has no effect upon the gametocytes of *P. falciparum* and is most widely used by children who are the source of infection. It is also expensive. This author considers that takequina a totaquina is eminently suitable for mass treatment and is cheap. The dose is 0.8 gm. daily for 14 days. Fifteen cases were treated with euquinine and 20 with takequina.

GUPTA (p 517) reports the treatment of a pregnant woman with *falciparum* malaria by the intramuscular injection of 10 grains of quinine three times daily for three days. Recovery was rapid and two months later she gave birth to a healthy child. Reference is made in the *Journal of the American Medical Association* (p 517) to experiments in which quinine was found in human milk soon after administration but not after 24 hours.

THOMAS and SYDENSTRICKER (p 812) treat cerebral malaria by giving 2 to 4 litres of Ringer's solution subcutaneously during the first 24 hours to combat dehydration. Dextrose solution 10 per cent. is given intravenously 500 cc. every four to six hours. Quinine dihydrochloride 0.5 gm. is added to the first dextrose injection and repeated every six hours until cerebral symptoms have disappeared.

The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1938, Vol. 35. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

or the patient can take drugs by the mouth. BORMIOLI (p. 29) treats pernicious *falciparum* infections by a first intravenous injection of 2 gm. quinine followed during the first 24 hours by three intramuscular injections each of 1 gm. quinine. On the second and third days 4 gm. daily are given by injection and further treatment on the same heroic scale is given if necessary. He states that this kills all forms of the parasite and prevents relapse.

MUHLERS (p. 103) reports cases of quinine idiosyncrasy with circulatory disturbances, urticaria, oedematous swellings of or hæmorrhages into or from skin and mucous membranes. These hæmorrhages may be serious, even fatal. The synthetic drugs have not produced hæmorrhages.

PIETRO (p. 510) gives a heavy course of treatment for malaria in Italian East Africa which includes quinine intravenously and by the mouth, the synthetic drugs, and neosalvarsan.

Comparisons between quinine and atabrin have been made by several authors. KRANZFELD *et al* (p. 420) treated 388 cases with acridine the Russian equivalent of atabrin (0.15 gm. b.i.d. for five days) and 94 with quinine (1.5 gm. daily). The proportions of parasitic relapses were almost equal *vixx* relapses being four times as frequent as *falciparum* with both treatments. TILLEMA (p. 421) treated 140 patients with quinine (0.4 gm. thrice daily for a week) and 120 with atabrin (0.1 gm. thrice daily for a week). Differences in results were negligible and relapses frequent. Quinine should be continued for a week and atabrin for five days after disappearance of parasites. OVERBEEK and GILBERT (p. 516) treated 100 cases of benign tertian malaria 53 with 0.3 gm. atabrin daily for five days 47 with 1.3 gm. quinine daily for seven days. The rates of action were equal, but three weeks after treatment 34 per cent. of the quinine group harboured parasites compared with 5.6 per cent. of the atabrin group. MIYAHARA (p. 516) after treating 30 cases with 0.3 gm. atabrin daily for five days concludes that it is no more effective than quinine in preventing relapses. *Vixx falciparum* and *malariae* infections were included.

These results should be compared with those of CALAN and others below.

Action.—The action of drugs on the various stages of parasites has been studied by a number of authors. CUDCA *et al* (p. 32) consider that the therapeutic action of quinine and atabrin are upon the asexual forms of the parasite and not upon the sporozoites or any intermediate stages. SURTON (p. 884) states that atabrin is known to produce morphological changes in both sexual and asexual forms of *P. vixx* and *P. malariae* and in the asexual forms of *P. falciparum*. Observations at Horton however have shown that atabrin is not without effect on the crescents of the Rumanian strain of *P. falciparum* in use there if administered before crescents are detected in the peripheral blood. When crescents appeared after this treatment, certain changes were noted and are described. DE SANT'ANA QUEIROZ (p. 565) in experiments on monkeys infected with *P. knowlesi* found that atabrin was progressively more active as the development of the parasites progressed—most so when given at the stage of chromatin division—much less so when sporulation was taking place.

GUNTZKOW (p. 569) describes a method of estimating atabrin in the blood, and CHOPRA and ROY (p. 570) one for estimating atabrin in tissues. WEISS (p. 103) discusses the estimation of atabrin in urine.

stools and blood. FARINAUD *et al* (p. 518) found that after a five-day course of quinacrine (the French equivalent of atebryn) the drug only appears in the urine after a lapse of time (4 days in the first case). It is then excreted for four or five days in considerable amounts becoming less and less for a month. A period of 70 days is usually required for total elimination but the total amount found in the urine is only a small proportion of the amount administered.

The Malaria Advisory Board of the Federated Malay States (p. 20) report that atebryn musonate is one of the most powerful schizonticides known but as toxic effects are occasionally alarming it is not a drug which can be recommended for indiscriminate use. [See also this *Bulletin* 1936 Vol. 33 p. 235-834.]

HILL (p. 657) considers that atebryn is the first drug known that could possibly be used effectively in mass treatment and prophylaxis. A curative dose can be given without interference with working efficiency.

MATILLA FÁBRIGA and VICH (p. 419) prescribe for persons over 10 years atebryn 0.3 gm. daily for seven days a pause of three days than plasmoquine 0.03 gm. daily for 5 days. They claim from 100 cases rapid cure and protection from relapses in benign and malignant tertian malaria. This treatment is not contraindicated in pregnancy and atebryn is the drug of choice in blackwater fever followed by plasmoquine if gametocytes are present. DOMÍNGUEZ CALÁN (p. 895) compares relapse rates of from 1.2 per cent. to nil in three groups of patients with *vivax* infection treated by three combinations of atebryn and plasmoquine (total 150 cases) with a relapse rate of 59.58 per cent in 2,712 cases treated with quinine for 20 days. VELMAN (p. 513) cured a child of four with atebryn and plasmoquine when quinine had failed and advocates atebryn for malaria in childhood. CHOPRA, HAYTER and SEN (p. 30) compared 45 cases of malaria (14 *vivax*, 20 *falciparum*, 3 *malariae* and 8 mixed infections) treated with atebryn plasmoquine dragées (atebryn 0.1 gm. plasmoquine 0.005 gm. one dragée thrice daily for five days) with 37 treated with atebryn alone. The combination is no more effective than atebryn alone in *vivax* and *malariae* cases but is more effective in *falciparum* infections especially if crescents are present. REV (p. 897) in Spain used Atepe tablets containing atebryn 0.1 gm. and plasmoquine 0.005 gm. in the treatment of 686 cases of benign tertian malaria. The dose for adults was 3 tablets daily for five or in severe cases seven consecutive days. The tablets were given in one daily dose. The relapse rate was 12 per cent.

NANDI and DIKSHIT (p. 664) describe a colour test for plasmoquine in blood and tissues. It is not suitable for urine.

Other drugs

MISSIROLI and MOSNA (p. 564) give 2 cgm. Cilonal (discovered by SCHULEMANN) daily for six days. They consider that used with quinine or atebryn cilonal provides a complete anti-malarial remedy. Its action on the gametes of *P. falciparum* is equal to that of plasmoquine and it is not toxic in efficient therapeutic doses. KIKUTHI (p. 563) found that Certuna (which is probably the same as cilonal) though inferior to plasmoquine possesses marked gametocidal power in malignant tertian malaria. His method of testing this power is described. MÜHLENS (p. 562) believes that Certuna (Bayer) is superior to plasmoquine as a gametocide in malignant tertian malaria. He

gives it after aiebrin in doses of 0.03 gm. or more daily for at least three days. STOLI (p. 563) increased the dose of Certuna to 0.07 gm. thrice daily for seven days. Cure is not obtained.

HILL and GOODWIN (p. 561) report very favourably on prontosil in 83 cases of *falciparum* and 7 of *vivax* infections. It was given intramuscularly 10 cc. every 12 hours. More than four injections were seldom necessary and it acted particularly rapidly if symptoms were severe. DÍAZ DE LEÓN (p. 581) treated 15 cases of benign tertian infection with rubiarol (prontosil) with completely satisfactory results. It was usually given by the mouth. READ and PINO (p. 582) on the other hand, consider that sulphonamide in benign tertian malaria has a poor specific antimalarial action. MOTZFELDT (p. 596) treated two patients undergoing a course of therapeutic malaria with prosectasine with good results. He states that all three principal forms of malaria are equally amenable to treatment by sulphanilamide but reserves opinion on the general use of this as a specific remedy.

GLYNN HUGHES, LOURIE and YORKE (p. 655) found that *n*-undecano 1-11 diamidine had a beneficial effect in human malaria, especially on the asexual forms of parasites. They do not however recommend the drug for treatment.

SAUTER (p. 30) reports that dihydroquinamine, though useful by intramuscular injection, produced nausea and gastralgia. By the mouth it was ineffective.

CABRAL (p. 31) treated 13 patients with M3 a double iodide of mercury and manganese combined with spleen extract. It is not a reliable gametocide but may improve general nutrition and anaemia and reduce the spleen. Symptoms of intolerance were observed in half the cases.

RADYAN *et al* (p. 34) discuss the action of acaprine with which they obtained favourable results in malarial splenomegaly. Its effects resemble those of adrenalin.

Ascoli's method

Page	Author	No. treated	Results and remarks
35	Marcialis <i>et al.</i>	15	Splenomegaly in children Satisfactory
563	Monaco <i>et al.</i>	6	Very satisfactory in all.
566	Acanfora	5	Chronic. Very satisfactory in all
658	Pizzillo	6	Acute. Adrenalin with quinine. Very satisfactory in quinine-resistant infections.
893	Milletari	70	Great value in splenomegaly and on patients general condition.
893	Moona	9	Chronic splenomegaly Good results in all.
893	Dell	6	Good results in all.
895	Noemoth	10	Primary attack treated with quinine. Then adrenalin. Three febrile relapses. Several parasite relapses.
895	Noemoth	6	Adrenalin no effect on crescents.

From this table it is seen that the results of adrenalin treatment are usually good. Marcialis administers it by intramuscular injection

in small children. The infections of Monaco's cases included *vivax falciparum* and *malariae*; those of Nucciotti's series were all *falciparum*. Otherwise the infections are not stated in the abstracts.

TIMPANO (p 104) describes the method of using the treatment in malaria and kala azar. Good results were obtained in both. The adrenalin is given 1 to 2 hours after quinine (or the antimony compound) if this is given by the intramuscular route. If by the intravenous method the adrenalin is given at the same time.

GOSTO (p 188) describes the measurement of the spleen by radioscopic methods. The adrenalin treatment is specific for the *stato malarico*. PIZZILLO (p 566) describes the form and rhythm observed in the changes of size of the spleen during the process of reduction under the Ascoli treatment.

Other methods

LORANDO and SOTERIADES (p 35) in Greece treated 20 more children suffering from malaria [their earlier paper dealt with 23 cases] with subcutaneous injections of maternal whole blood which presumably contains immune bodies. In some cases small doses of quinine were given also but in 9 haemotherapy alone was used. In all cases the treatment was successful with a rapid fall in temperature and reduction in the size of the spleen. Many remained free from fever for a long period although living where reinfection is inevitable. [See also this *Bulletin* 1937 Vol 34 p 63]. ARACTINGI (p 31) treated 100 patients (principally with *vivax* infections) with subcutaneous injections of their own blood in 10 cc. doses at 3 to 5 days interval to a total of 40 cc. The blood was taken and injected during fever free periods and the treatment was conceived on the supposition that at such times the blood contains a toxin which injected leads to the formation of antitoxin. In 80 of 100 patients fever ceased after the third injection and no relapses occurred during seven months. In 15 fever ceased after the fourth injection and reappeared slightly after three weeks. In 5 no benefit was seen.

Prophylaxis

(a) Drugs

Opinion as to the value of drug prophylaxis is somewhat divided but favourable reports are given. It seems probable that regular drug taking leads to increased susceptibility if the drugs are discontinued. This may be due to loss of immunity.

PARROT *et al* (p 422) found that the daily administration of quinine reduced spleen rates and brought parasite and gametocyte rates to zero. Quinacrine was less successful probably owing to under-dosage. In both the gametocyte rate followed the curve of the parasite rate and the authors think that both drugs have some action on young gametocytes.

MEZINCESCU *et al* (p 422) in 1935 observed a village of 271 inhabitants. In 101 given atabrin prophylactically the parasite index was 1.9 per cent. in 99 given quinine 1.8 per cent. in 71 controls 15.1 per cent. There were practically no cases of clinical malaria in the treated groups. In 1936 no drugs were given in this manner and in the atabrin group there were 33 cases of malaria, in the quinine group 26 and in the controls 18. FIELD, NIVEN and HODGKIN (p 36) gave atabrin (0.2 gm. on two successive days of each week) and quinine bihydrochloride (0.4 gm.

daily) to two groups of persons on a plantation in the Federated Malay States. A third group acted as control. Smaller doses were given to children. The groups were observed for 15 months and during the last six the reduction in malaria in the treated groups amounted almost to elimination, but when the drugs were stopped malaria rapidly reappeared and was almost twice as frequent in the treated groups as in the controls. The action of the drugs was, in effect, to prolong the incubation period up to as long as one year. Atebrin was more potent than quinine and the risks are very slight.

RACHINA *et al.* (p. 33) conclude that the usefulness of both acríquine and quinine prophylactic courses is most evident if they are begun a few days before the annual wave of benign tertian relapses. Acríquine is rather more successful than quinine. HILL and GOODWIN (p. 37) in America treated groups with atebrin (1½ grains thrice weekly) and quinine (10 grains daily). The percentages of new infections were atebrin group 1.8, quinine group 5.5, control group 31.6. LAVERGNE (p. 562) considers the synthetic remedies better than quinine for collective prophylaxis.

CLARK and KOMP (p. 806) in Panama found that quinine, atebrin and plasmoquine prophylaxis does not give promising results. Carriers are missed at each survey and are enough to keep up transmission. Some natural immunity may be destroyed by treating subclinical cases. Immediate treatment of clinical cases is a most useful measure where the elimination of *Anopheles* is impossible.

FARINAUD and MOREAU (p. 167) find in Indo-China that in a few areas of moderate endemicity with a marked and limited seasonal prevalence the use of synthetic remedies as the sole measure of prophylaxis has given good and lasting results. In hyperendemic areas they are insufficient, and almost continuous treatment is neither practicable nor desirable.

MOSMA and CANALIS (p. 28) in a well controlled experiment, found that atebrin administered 0.2 gm. twice weekly (adult dose) to a section of the population of a village in Sardinia appeared to exert a very considerable prophylactic influence both during the period of administration and for six months afterwards. Daily atebrin was also successful but to a lesser extent. WINCHESTER (p. 567) in the Southern United States gave atebrin daily to 428 persons. No malaria occurred in the season but in a control group of 202 the incidence was 24.3 per cent. Parasite carriers were not found in the prophylactic group but in the control group they numbered 19.6 per cent. The common infection is *falciparum*. JALALYAN and KARASEVA (p. 33) found that 3.1 per cent of 127 persons taking atebrin had attacks of malaria as against 13.2 per cent. of 114 controls.

WINCHESTER (p. 658) considers that using atebrin one can control, if not eradicate malaria in the Southern United States but that anti-mosquito and anti-larval measures should also be used. HOORS (p. 659) in Malacca, gives two tablets of atebrin twice weekly for four weeks and two tablets once weekly thereafter. This can suppress clinical manifestations where anti-larval measures are only partially effective.

OGANOV *et al.* (p. 32) found that 0.4 gm. acríquine given every 10 days had a good prophylactic effect. By successfully suppressing clinical symptoms, which are bound up with the appearance of gametocytes, it may be used to lower the infectivity of mosquitoes. SICAUT and MESSERLIN (p. 421) remark that for clinical prophylaxis

among a population living in a moderate or severe endemic zone and consequently premunized, it suffices to treat the children and the sick. Quinacrine and praequine are given every 8, 10 or 15 days according to the intensity of the prevalence of anophelines and of gamete carriers. In insufficiently premunized communities threatened with unusual outbreaks the whole population should be treated in the same way. The state of premunition is determined by the relation of the parasite index of children to that of adults and by the splenometric index.

CIUCA *et al* (p 899) found that with a six months atebirin and plasmoquine prophylactic treatment 1.3 per cent of the treated and 8.1 per cent of the untreated or irregularly treated suffered from malaria. Splenic splenometric and parasite indexes had fallen considerably at the end of a six months course and were considerably lower than before the experiment after a period of two years during which only clinical cases were treated. SICAULT and MESSERLIN (p 421) in Morocco for the eradication of malaria gave quinacrine 0.3 gm. and praequine (plasmoquine) 0.03 gm weekly to all infected persons identified either clinically, serologically or haematologically. Anti-larval measures are also conducted. BLOMMINI (p 810) found that atebirin and plasmoquine administered each Saturday and Sunday in Italy gave encouraging results. Clinical attacks were less frequent in the treated group than in the rest of the population.

Senior WHITE and ADRIKARI (p 567) report that no delay caused by malaria was experienced in a labour camp where each person received a course of atebirin followed by a weekly dose of plasmoquine. Previously malaria had been a serious matter.

FARINAUD (p 562) found in Madagascar that two courses of quina-crine and rhodoquine cleared the blood of 94 per cent of children who had previously shown parasites, when examined up to one month after completion of the treatment. DUBOUX *et al* (p 566) gave premaline (a tablet containing quinacrine, rhodoquine and praequine) regularly to 27,097 persons in Tunis over a period of 5½ months. Spleen, parasite and gamete indices fell remarkably and clinical relapses were rare. The authors are enthusiastic about the results.

CHOPRA and BASU (p 569) found that plasmoquine in doses of 0.02 gm was effective in preventing the development of crescents in *A. stephensi* but atebirin and malarcan prevented the development of gametocytes of *P. malariae* and quinine arrested development of oöcysts in *ritax* infections. TIBOURSKAJA (p 35) advocates that all gametocyte carriers should be given 0.03 gm plasmocide thrice daily every third day until a few days after the gametocytes have disappeared in order to render them incapable of infecting mosquitoes.

(b) Other measures

General—DECOURT (p 898) discusses the limit of benignity or the degree of malaria infestation above which pernicious forms appear. In most regions there are virulent areas which maintain dangerous strains of parasites and conserve active malaria. Antiplasmodial measures should include chemoprophylaxis for the virulent areas and areas of moderate endemicity, sanitary barrages, the search for and treatment of cases and hygienic prophylaxis. EARLE (p 21) shows that in Porto Rico the malaria prevalence was not affected until the mosquito density had been brought down to and maintained at an extremely low figure. SICAULT and MESSERLIN (p 421) realize that in

Morocco attempts at the eradication of malaria are only possible in places where anopheline infestation is moderate and the disease not widespread.

ROUBAUD (p. 568) shows that improvement in housing conditions and social progress favour the development of zoophilic deviation of Anopheles. This deviation is a vast biological phenomenon and the first necessity seems to be a general transformation in the conditions of human life. GROOTINGS (p. 903) advocates, in those parts of the Dutch East Indies where increased malaria has followed house improvement inaugurated as a protection against plague that drainage channels and the water surface of ponds should be cleaned, swamps should be drained and dried and stalks cut and burned after the harvest fish should be introduced to eat pond vegetation and possibly that mosquito curtains should be distributed. The Malaria Advisory Board of the Federated Malay States (p. 20) draws attention to the necessity for filling in holes left by uprooting trees on rubber estates. CORRADETTI (p. 573) in Italy found that *A. cius* was present in abundance where bonification had either not been or had only imperfectly been carried out and its prevalence diminished in direct proportion to the progress in bonification achieved.

DR PALMAS and SANCZ (p. 281) detail the measures which succeeded in converting a very unhealthy military post in Tonking into a comparatively healthy station. These include clearing and levelling drainage and oiling, the use of mosquito nets and prophylactic quinine.

WATSON and SPAIN (p. 188) in Alabama think that the creation of lakes by the impounding of the water of the Tennessee would lessen rather than increase malaria transmission if modern anti-larval measures are carried out through the breeding season. CARR (p. 900) reports that the shading of watercourses by planted *Ficus benjamina* is an important measure in the eradication of larvae of *A. albimanus* in Cuba.

HILL (p. 23) in Portugal records that intermittent irrigation of rice fields has proved successful experimentally in the control of breeding but screening of labour barracks and improvement in agricultural methods are necessary. SMALT (p. 427) found in Bali that draining rice fields for two successive days every nine days reduces the number of larvae of *A. aconitus* to one-third or less of the figure found previously without serious loss of produce. SCHARFF (p. 98) finds shading or finishing and agitation of the water surface to be useful measures of control in Malaya.

Drainage.—RECTOR (p. 812) describes control in Mississippi. Ditch lining receives most attention. A round bottom invert with the banks of the ditch covered with Bermuda sod gives the best results. Wood ash is used as a fertilizer for the sod. HARKNESS and SAMARA (p. 98) used dynamite in the excavation of drainage canals in Palestine. They describe the method, which is not suitable for dry soil or semi-liquid marsh. Excavation by hand labour costs ten times as much. Oiling.—WATSON (p. 258) considers that the killing power of a larvicide may be best estimated by noting the interval which elapses between the entry of oil into the breathing tubes and the moment when the heart muscle finally ceases to contract. This may be determined by the cessation of tracheal movements. Paris green behaves in larvae as in man as a gastro-intestinal poison. MURRAY (p. 654) discusses the stability of oil films. The conclusions cannot be further abstracted. MANSO (p. 811) describes a method of oiling streams in

Assam which consists of an oiled gunny mat which is unrolled on to the surface of the water. The method is cheap and effective.

Dusting—BRASIER-CREAGH (p 725) describes the dusting with Paris green of flooded land near Delhi by means of a D.H.83 Fox Moth aeroplane. Slow and low flights should be made and the pilot should know the ground and the day to day changes in the position of the flood water. WATSON HIKER and JOHNSON (p 512) find that aeroplane dusting of Paris green is useful in somewhat open water with low emergent vegetation but not where there is dense horizontally locking vegetation. The usual height of flying is 25 feet. HIKER *et al* (p 805) show that one pound of Paris green per acre in a 20 per cent by volume mixture gave good results when distributed from an aeroplane on Lake Wheeler Tennessee. It is not successful in areas of dense vegetation. RAO and SWIFT (p 97) used 1 per cent of Paris green in road dust and wood ash for dusting rice plots in Mysore. Over a period of three years no evidence was found of any adverse influence on the yield of rice or straw.

PIVOVAROV and GUTERMAN (p 512) describe the results of using anabasin, a powder insecticide of the nicotine type. KALANDADZE and LEIMER (p 573) investigated chloropicrin as a larvicide. It is successful when used to moisten sawdust which is then broadcast. It is expensive.

Larvivorous fish—MORIN and MARTIN (p 38) give practical details concerning larvivorous fish. They are seldom adequate alone but form a valuable supplement to other measures such as the use of Paris green. MORIN and MOREAU (p 188) consider that small larvicidal fish may be of great value in the centre and south of Annam but that in the north larger omnivorous varieties are necessary. COLLIGNON *et al* (p 261) report that increased attention is being paid to *Gambusia* as a larvicide in Algeria.

Spraying—COVELL, MULLIGAN and AFRIDI (p 901) report very encouraging results from the regular spraying of native houses with Pyrocyde 20 diluted with 19 times its volume of kerosene. At first 2 cc. per 1 000 cubic feet of air space was used, later the quantity was halved. Rooms were closed for half an hour after spraying. Various communities and two villages were treated in this fashion twice a week or oftener. Cowsheds were also sprayed. The results (which are given in the abstract) were remarkably good and the cost was about fourpence per head for the malaria season. GINSBURG (p 260) reports favourably on the protection of outdoor gatherings against mosquitoes by the production of a cloud of atomized dilute emulsified kerosene pyrethrum extract.

Screening—BLACKLOCK (p 259) points out that since a certain proportion of *A. funestus* and *Aedes* can pass through a 14-mesh screen-cloth made of wire of 30 Imperial S.W.G. It is unsafe to use this gauze without experimental proof of its efficiency in each locality. CHIRILOVA and SCHLONOVA (p 36) found in Russia that the use of metallic screening combined with mosquito nets gives considerable protection but the necessity of killing all adult mosquitoes in dwellings should not be overlooked. BESSLER (p 656) compared 19 metallic gauzes over a period of 7 years. The best results were seen with steel, aluminium, bronze, Monel metal and galvanized iron. All were durable except galvanized iron even in coastal regions.

GORE (p 199) describes a simple mosquito trap.

Research

CRUCA *et al.* (p. 28) dissected infected salivary glands of *Anopheles* in solutions of basic quinine and atabrin each in 1 in 2,500 concentration. The sporozoites were in contact with the drugs for 15 minutes. One patient of four in the atabrin and two of four in the quinine experiment became infected after receiving injections of the suspensions.

RAFFAELE (p. 100) shows that the blood of canaries injected intravenously with large numbers of sporozoites of *P. praecox* is not infective until after three days. Human findings are similar. The sporozoites probably enter the reticulo-endothelial cells.

MISSIROGLI (p. 599) from observations on the (so called) sporozoites of *P. praecox* (*velicium*) injected into canaries concludes that they are in reality immature sporocysts which continue their development in the lymph spaces and give rise to sporozoites, not more than eight from each.

YORLI (p. 732) has succeeded in infecting *Anopheles* by inducing them to feed through a membrane prepared from the skin of a rabbit's ear stretched over a tube containing gametocytes in defibrinated blood kept for five hours at 23 to 27°C or for 72 hours in the ice box.

GARCIA (p. 816) for the study of parasites puts up malaria infected blood as for culture and keeps it at 10°C instead of 37°C. SIMONS (p. 814) describes a rapid method of staining blood films in which saponin is used for haemolysis and methylene blue for staining. MATUMOTO and HIRASAKI (p. 815) describe a method for the simultaneous staining of large numbers of films.

Malaria in Monkeys and Birds

MOSKA (p. 731) tested various African monkeys as hosts for *P. knowlesi*. None was as satisfactory as the Indian *M. rhesus*.

JOLLY LAVERGNE and TANGUY (p. 107) found the cycle of *P. knowlesi* to be 20 hours instead of the usually accepted 24. Passage through man reduces the virulence so that in *Cynocephalus papio* only mild chronic infection is produced.

RODHAIN and VAN DEN BERGHE (p. 107) describe *P. gonderi* of monkeys which, in view of its 72 hours cycle they regard as a distinct species. SINTON had previously regarded it as the variety *gonderi* of *P. swinsii*.

RODHAIN and MUYLLE (p. 816) failed to infect three patients with the virus (one patient) and *falciparum* (two patients) types of the species of *Plasmodium* of chimpanzees though no difficulty was found in the transmission of infection to other chimpanzees.

WEYER (p. 107) found that complete development of *P. knowlesi* in *P. cynomolgus* and *P. swinsii* takes place in *A. maculipennis* although injection of apparently normal sporozoites from the salivary glands did not produce infection. The reason for this is not clear.

MALANOS (p. 108) studied immunity in monkeys. A high degree of acquired immunity can be produced by repeated super-infections. It is strictly specific and limited to homologous strains of the same parasite. It breaks down if splenectomy is performed or if the R.E.S. is blocked but even then it may be produced by reinfection, and disappears after treatment and complete eradication of the parasites to the extent that reinfection can be carried out, but the decreasing intensity of subsequent infections in certain cases indicates that some degree of immunity remains. Natural immunity is very rare. Das

GUPTA (p 732) found that in monkeys immunity to *P knowlesi* persisted only as long as parasites remained in the body With complete eradication of infection the immunity was lost

COGGESHALL (p 109) found in monkeys that the greatest degree of splenomegaly was associated with the milder and more slowly developing infections and was accelerated by repeated injections of parasites

MALAMOS (p 108) noted auto-agglutination of red cells in one of 200 monkeys infected with *P knowlesi* A large number of the cells in each clump contained half-grown parasites The phenomenon persisted after atebirin treatment

COGGESHALL and KUMM (p 109) demonstrated that the serum of monkeys with chronic infection has a depressing effect on the course of the disease if injected into monkeys with an acute attack [See also LORANDO and SOTERIADES above]

MANWELL (p 731) working on cross immunity with nine species of bird malaria parasites found that *P elongatum* did not protect against any other and conversely Four small parasites like *P rouxi* protected against each other and against *P cathemerium* but not against *P praecox*

MANWELL and HEWITT (p 104) cultured *P praecox* of birds in capillary tubes at 25°C. A small quantity of heparin was added to prevent coagulation

BRUMPT (p 105) gives a list of birds susceptible to and of those refractory to infection by *P gallinaceum* In fowls up to 90 per cent of red cells may harbour parasites without there being signs of illness until about two days before death *Aedes aegypti* and *Aedes albopictus* are vectors. KIKUTH (p 729) confirms the work of BRUMPT on *P gallinaceum* and its development in *Aedes aegypti* He observed the pigmentless schizonts described by JAMES and TATE in *P gallinaceum*, *P cathemerium* and *P praecox* infections. The number found bears no relation to the intensity of the infection. They may be found in the brain kidney lung liver heart and bone marrow 72 hours after sporozoite injection KIKUTH and MUDROW (p 729) however state that the number of these forms in the internal organs increased with the severity of the blood infection They do not think that these schizonts belong to parasites other than those of malaria. RODHAIN (p 899) found endothelial non pigmented schizonts in penguins in Antwerp infected with *P praecox* These occur not only in the fixed endothelial cells but also in the monocytes and histiocytes of the blood and the author considers them to be derived directly from the sporozoites of mosquito infection BRUMPT (p 104) considers that the irregularity of the occurrence of schizonts of *P gallinaceum* within endothelial cells points to accidental ingestion rather than an essential stage in development

HEGNER and WOLFSON (p 730) however consider that further work is necessary before it can be concluded that endothelial schizonts actually belong to the malarial parasites and not to toxoplasms which are relatively common parasites of birds.

GAMBRELL (p 729) studied gametogenesis in *P cathemerium* and *P relidum* var *matulinum* infections Pregametocytes appear at each schizogony (which takes place at 24 hour intervals) and reach maturity 6 to 10 hours later Strains vary in their capacity to produce gametocytes A strain started from a single cell by STAUBER produced

AMOEBIASIS

PRECIS OF ABSTRACTS IN THIS SECTION

Vlassani (p 283) describes an outbreak of amoebic dysentery on a torpedo boat. Two members of the crew were cyst passers

ARCHETTI (p 283) notes that the disease is widespread in Italian East Africa.

TCHALAJA (p 284) shows that in culture the variation in the long and short diameters of vegetative amoebae extends from 5 to 48 μ and 5 to 33 μ respectively

PAVLOVA (p 284) found that locomotion and the formation of ectoplasmic pseudopodia cannot alone be used as differential criteria between *E. histolytica* and *E. coli*

DESCHENS (p 284) finds that bilirubin like haemoglobin is a stimulant to the growth of *E. histolytica* in culture but (with DOPTER, p 285) that bile at 1 in 1 000 dilution checks development and at 1 in 100 kills the amoebae Bile salts and cholesterol similarly retard development

TSUCHIYA (p 285) induced encystment of *E. histolytica* on Loeffler's slants covered with Ringer's solution to which starch is added, but these cysts had apparently lost in culture their pathogenicity for kittens PAVLOVA (p 286) describes simple and efficient culture media of salt phosphate buffer solution horse serum and starch. DOPTER and DESCHENS (p 286) show that *E. histolytica* grows much more easily on coagulated horse serum slopes when human serum is added to the Ringer's solution with which the slopes are covered. Serum from amoebic dysentery patients is only half as good as that from normal persons but serum from jaundiced patients is better than normal.

PAVLOVA (p 287) found that in culture *E. histolytica* only ingested human red cells between pH 5.8 and 6.5 Findings suggested that thermolabile factors inhibiting phagocytosis exist in horse serum DESCHENS (p 287) found that the pathogenicity for cats of *E. histolytica* maintained in culture is 50 per cent. between 56 and 124 days and only 20 per cent. between 542 and 652 days This loss is attributed to changes in the accompanying bacteria.

WESTPHAL (p 288) considers that *E. histolytica* is capable of both intra and extra-cellular digestion Proteolytic ferments but no toxins, are produced. Normally it exists as a harmless amoeba in the lumen of the gut (*mulina* form) and the extent to which it may become pathogenic depends on the tissue resistance of the host which may be broken down by bacteria. In the tropics conditions favour the reproduction of *E. histolytica* and virulent strains therefore ensue BENZONI (p 289) also accepts the view that it is normally harmless.

SWARTZWELDER (p 290) showed that unencysted *E. histolytica* could produce dysentery in dogs when administered by the mouth. Gastric juice was therefore not an efficient barrier DESCHENS (p 290) showed that a strain of *Bact. coli* capable of producing simple enteritis in cats increased, when added to a culture of *E. histolytica* the virulence of that organism more than twofold. The simple enteritis is apparently a predisposing factor He (p 290-291) further showed by animal experiment that certain groups of bacteria enable *E. histolytica* to give rise to amoebic dysentery and supports this view by epidemiological observations. Similarly DESCHENS and DECOURT (p 292) found that a toxic enteritis caused by croton oil

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gametocytes in the normal manner showing that they are offshoots of asexual forms.

CHORNE (p 730) found in fowls infected with *P. gallinaceum* a slight diminution in blood englobulin and a marked increase in pseudoglobulin. In human malaria there is a great increase in englobulin.

MASIROLI (p 104) showed that sporozoites of *P. fovear* (*redicium*) from the body cavity and mature malarial cysts of mosquitoes are infective. Maturation in the salivary glands is therefore not necessary but SANDICCHI (p 816) points out that in the dissection of mosquitoes heavily infected salivary glands may rupture and liberate mature sporozoites into the body cavity. This may explain why sporozoites from the body cavity have been held to be infective.

OESTERLE (p 103) found that the activity of methylene blue which is a gametocidal agent is due to its action on the respiratory metabolism of the cell that of plasmoquine is increased by products of glucose which play an important part in cell respiration that of quinine is unaltered by the addition of such respiratory metabolic products. These studies were made in birds. ALBAICHT and METWEXBUTTE (p 106) found that methylene blue (intramuscularly) combined with quinine is much more effective in *P. fovear* infection of birds than quinine alone. He suggests its use in human malaria.

BITTLE *et al* (p 731) found that changes in the viri side chain in quinine and quinidine do not alter the antimalarial action, but that any interference with the central -CHOH group partially or completely destroys it.

COGGESWELL (p 897) found that sulphanilamide was capable of preventing the onset of malaria or of producing a chronic low grade infection in rhesus monkeys infected with *P. knowlesi* and was useful in prophylaxis. Sulphanil-sulphonate has therapeutic, but no prophylactic value. Neither drug has any value in *P. calomacrum* or *P. leptarai* infections in canaries or young chicks. CHOPRA and DAS GUPTA (p 800) found salmepastine to be a specific for *P. knowlesi* infections in monkeys.

RONHAUX and HENDRIX (p 106) found that "*Paludex*" had no favourable action in infections by *P. calomacrum*, *H. oregonense*, *P. knowlesi* and *P. gonderi*.
C II

AMOEBIASIS

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favoured the establishment of the amoeba in the cat's intestine GAUDUCHEAU (p. 292) transformed latent amoebic infection into dysentery in animals by inoculating a bacillus and a virus.

SARATISSJAK (p. 292) concludes from experiments that amoebae from symptomless carriers are identical with pathogenic *E. histolytica*. FRYE and MELENKY (p. 293) conclude from experiments that a small race of *E. histolytica* exists which is relatively fixed in its size and activity and that it possesses a low power of invasion of the tissues of man and experimental animals.

WILKINSON (p. 293) concludes that sigmoidoscopy is useful for the confirmation of diagnosis in a small proportion only. BOWEN (p. 294) uses a histidine cutaneous test. He infers that there is a distinct affect and is reduced by treatment. He infers that there is a distinct affect of general and local protein metabolism. PAULSON and ANDERSON (p. 294) found that the complement fixation test is unreliable in the individual case and not so valuable as microscopic faecal examination. CRAIG and SWARTZWELDER (p. 294) found that four monkeys infected with *E. histolytica* all gave positive complement reactions. This result did not agree with previous findings by MELENKY and FRYE. MANSON BARR (p. 295) found *E. histolytica* in the discharge from the ulcerated abdominal wall around a colostomy opening. Emetine and yatra treatment was successful and the colostomy wound was finally closed. PIZRI *et al.* (p. 295) discuss a case of a cyst of the lung associated with, but not proved to be caused by, an amoebic liver abscess. WU (p. 295) found amoebae in a nasopharyngeal polyp. Fusiform bacilli were also present. It could not be decided whether the amoebae were *gigas* or *histolytica*. LOUZEZAS *et al.* (p. 296) describe a patient whose neuritis (with paralysis) cleared up when emetine was given for an attack of amoebic dysentery.

SAUTET (p. 296) points out that obscure hepatic conditions in the tropics and subtropics are often due to amoebiasis. Previous history of dysentery does not always occur.

HUARD LOYO and GRAHAM (p. 296) describe a series of 48 liver abscesses, of which only three were amoebic seen in Indo-China. Open operation was the usual treatment in the bacterial cases, but in amoebic cases they gave emetine intravenously and use adrenalin to counteract depressant effects. A table of mortality from many authors is given. WIJERAMA (p. 298) records 48 patients of liver abscess of whom 34 gave a history of previous dysentery. Treatment with emetine with or without aspiration was very successful. One died after operation. PEIRIS (p. 298) describes the clinical picture in 28 cases of liver abscess. Treatment was by emetine and aspiration. The commonest complication of untreated abscess was rupture. BROWN and HODGSON (p. 299) found that 18 per cent of liver abscesses at the Mayo clinic were due to amoebiasis. They gave the symptoms, methods of diagnosis and treatment and stress the importance of emetine. TRAUB and RASCH (p. 300) describe the symptoms in a case of amoebic hepatitis. These disappeared under emetine treatment but an increasing leucocytosis remained, possibly indicating abscess.

DAVIS (p. 300) records a patient whose symptoms and X-ray suggested a pneumonic condition. No fluid was found in the pleural cavity and faecal examination was negative. Treatment was unsuccessful until emetine was tried as a shot in the dark when rapid improvement occurred.

MATTEI (p 301) details the alimentary urinary and circulatory premonitory symptoms of emetine poisoning. Polyneuritis and cardiac insufficiency are symptoms of established poisoning. He recommends caution in dosage.

HAKANSSON (p 302) gives the results of treatment with Carbarsone. An intensive 10 day course in which 5 to 10 gm. were given in all produced the best results. GRASSO (p 303) recommends 75 mgm per kilo body weight over a period of at least 10 days in the use of Fenarsone (the Italian equivalent of Carbarsone). The drug is valuable. PYMAN (p 303) tested derivatives of harmol as amoebicides in cultures and in animals. They are less effective than emetine in the treatment of amoebic infections.

HILLEMANN and GAUBE (p 304) deal with treatment in general.

BOVAIN and ARETAS (p 304) found that emetine resistance could be induced by growing *E. histolytica* in media containing emetine. This persists to some extent after 10 subcultures in emetine-free media. VALETTE and ROLLÉ (p 304) observed by ultraviolet illumination that quinine enters *Amoeba dubia* and fixes itself to certain inclusions or vacuoles in greater concentration than in the surrounding solution.

DESCHENS and PROVOST (p 305) experimentally infect cats directly into the ileum during laparotomy. C W

MASSANI (R. M. Mario) Osservazioni su di una piccola epidemia di amebiasi intestinale manifestatasi a bordo di una torpediniera. [A Small Outbreak of Amoebic Dysentery on a Torpedo-boat.]—*Ann di Med Nav e Colon* 1938 July-Aug Vol 44 No 7-8 pp 301-305

At the end of September 1937 on two successive days a patient from a torpedo-boat reported sick with symptoms of dysentery and examination of the stools revealed *E. histolytica* both vegetative and cyst forms. Examination of others of the ship's complement showed nine to be infected and details of each of these are given. Five of them presented definite symptoms passing mucus and blood one merely ordinary diarrhoeic stools three appeared to be in good health but were cyst passers. Two of the last had suffered from gastrointestinal disturbance in Crenalea previously. When these patients were properly dealt with no further cases occurred. To avoid such occurrences it is suggested that care should be taken to examine those who have lived in Africa before being accepted in the service to keep a record of those who have suffered from amoebiasis clinically and been cured to examine such periodically and particularly to keep watch on those engaged in the handling of food. II II S

ARCHETTI (Italo) Considerazioni sull'amebiasi nelle terre dell'Impero [Amoebiasis in Italian East Africa.]—*Riv di Biol Colon* Rome 1938 Aug Vol 1 No 4 pp 281-291 [13 refs] English summary (2 lines)

The author has collected from the literature records of cases of infection by *E. histolytica* in those parts of East Africa which are under Italian rule. He shows that the distribution is not only widespread but in places also fairly intense. The article contains no original observations. II II S

[April, 1939]

SORGE (Giuseppe) *Epidemiologia e profilassi dell amebiasi logy and Prophylaxis of Amoebiasis*.—Reprinted from *Epidemiologia e Profilassi* 1938 Apr. No. 4 18 pp [84 refs.]

TCHALAJA (L. E.) [Morphological Study of a Pure Line of *Entamoeba histolytica* in Culture].—*Mémoires Parasit. & Parasitic Dis.* Moscow 1938 Vol. 7 No. 1 [In Russian pp 85-109 With 15 figs. on 2 plates & 3 diagrams. French summary p. 109.]

The author records the results of a detailed morphological study of a pure line strain of *Entamoeba histolytica* grown in culture on a fluid cardiac [?] medium. From measurements of stained specimens taken at different intervals the long and short diameters of the vegetative amoebae were found to vary from 5 to 48 μ and 5 to 33 μ respectively (mean $21 \times 15 \mu$). The amplitude of variation in the dimensions increased with the age of the culture the maximum coinciding with a higher rate of multiplication of the amoebae. The nucleus varied in size (diameter) from 2 to 7 μ . The majority of nuclei had the typical structure deviations from this structure are attributed to the physiological state of the organism. The paper is illustrated by graphs and figures.

PATLOVA (E. A.) [Comparative Study of Locomotion in *Entamoeba histolytica* and *E. coli*].—*Mémoires Parasit. & Parasitic Dis.* Moscow 1938 Vol. 7 No. 1 [In Russian pp 110-118. With 8 figs. French summary p. 118.]

Working with cultures and faecal forms the author has made comparative observations on the locomotion of *Entamoeba histolytica* and *E. coli* under various conditions, the object being to ascertain whether locomotion can serve for the differential diagnosis of these species. In the case of both amoebae it was found that the greater activity was manifested at pH 8.5 the rate of locomotion being higher at body temperature than at room temperature. Neither of the amoebae when freshly isolated from the faeces or culture and observed at 37°C., showed a sharp differentiation between ectoplasm and endoplasm, and locomotion in both took place without the formation of hyaline pseudopodia. On the other hand amoebae of both species produce such pseudopodia some time after isolation, *E. histolytica* retaining its motility and pseudopodia for a longer period than *E. coli* on account of which the formation of these ectoplasmic outgrowths is more commonly attributed to the dysentery amoeba. It is concluded that the differential diagnostic importance of ectoplasmic pseudopodia is only relative and can only be used if allowance is made for the freshness of the material, and in conjunction with other characters. The movements of the amoebae are illustrated by a series of figures.

DESCHEUX (R.) *Affinité alimentaire de l'amibe dysentérique pour la bilirubine* (Alimentary Affinity of the Dysentery Amoeba for Bilirubin).—*Bull. Soc. Path. Exot.* 1938. July 6 Vol. 31 No. 7 pp 626-633 With 2 figs. on 1 plate.

The author finds that the addition of bilirubin in crystalline form or in solution to culture medium for *E. histolytica* is a stimulant to growth.

Moreover the amoebae ingest with avidity the crystals which appear to be utilized as a nutriment. If both rice starch and bilirubin are added to the culture tubes the cultures behave as regards development of the amoebae with a great regularity. The stimulating action of bilirubin is compared with that of haemoglobin which has also been shown by the author to be beneficial to growth. The liking of the amoebae for bilirubin may explain to some extent the frequency of amoebic abscess of the liver in connexion with amoebic dysentery.

C M Henyon

DOTTER (Ch.) & DESCHIENS (R.) Action de la bilirubine et de la bile totale sur les amibes dysentériques [Action of Bilirubin and of Bile on Dysentery Amoebae].—*C R Soc Biol* 1938 Vol. 129 No 30 pp 626-628

The authors find that the addition of bilirubin in crystalline form or in solution to culture media for the growth of *E. histolytica* has a stimulating action on the amoebae. Bile on the other hand in concentrations of 1 in 1 000 upwards checks the development while with a concentration of 1 in 100 all the amoebae are killed.

C M H

DOTTER (Ch.) & DESCHIENS (R.) Action des sels biliaires et du cholestérol sur les cultures d'amibes dysentériques [Action of Bile Salts and Cholesterol on Cultures of Dysentery Amoebae].—*C R Soc Biol* 1938 Vol 129 No 30 pp 628-632

Having shown that bilirubin acts favourably on *E. histolytica* in culture while bile has the opposite effect it seemed of interest to test the action of bile salts and cholesterol. It was found that these substances did not stimulate the growth of the amoebae and in certain concentrations actually retarded development. It would appear therefore that the good effect on the growth of the amoebae of adding to the medium the serum from cases of jaundice as previously reported is attributable to the presence in such serum of bilirubin.

C M H

TSUCHIYA (H.) Observations on Induced Encystment of *Entamoeba histolytica* in Vitro.—*Jl Lab & Clin Med* 1937 Dec Vol 23 No 3 pp 261-268 [16 refs]

The author shows that *Entamoeba histolytica* cultivated on S.C. medium, i.e. nutrient broth starch and charcoal with or without Dorsett's egg medium (see *Jl Lab & Clin Med* 1933-34 Vol 19 p 495) in which encystment does not occur will readily encyst when transferred to a medium consisting of Loeffler's slants covered with Ringer's fluid to which some starch has been added. The maximum encystation occurred after incubation at 37°C for 48 to 51 hours. It was found that at refrigerator or room temperature uninucleate or binucleated cysts continue to develop to the 4 nucleate stage. At the same time the chromatoid bodies tended to disappear. Kept at 37°C. the cysts degenerated. Though apparently normal in every way these

induced cysts orally administered failed to produce lesions in kittens or rats, though harmless infection with amoebae resulted in some cases in these animals. The original pathogenicity of the cysts from the human case as had been proved by administration to kittens, had been lost on culture. As judged by their power to excyst in suitable media it was found that the cysts survived for 40 to 45 days at refrigerator temperature and for 6 to 8 days at room temperature. C M IF

PAVLOVA (E. A.) Sur les méthodes de la culture d *Entamoeba histolytica* [Culture Methods for *Entamoeba histolytica*].—*Med Parasit. & Parasitic Dis Moscow* 1933. Vol. 7 No. 2. [In Russian pp. 224-227 (16 refs.) French summary p. 227]

The author maintains that for the successful culture of *E. histolytica* it is quite unnecessary to use complicated media with Locke or Ringer solutions or extract of heart muscle. A simple medium consists of a solution of sodium chloride to which is added a phosphate buffer such as that of SORESENSEN at pH 6.5 horse serum to a strength of 1 in 20 and a little starch. In such a medium both primary cultures and subcultures succeed and the amoebae can be maintained indefinitely by subculturing every 72 hours. For each test tube the following quantities are used —

1	Solution of NaCl 0.9 per cent	9 cc.
2	Phosphate buffer of Sorensen pH 6.5	2 cc.
3	Horse serum	0.5 cc.
4	Rice starch	1 loopful.

As an alternative the following may be employed —

1	Disodium phosphate ($\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$)	0.3564 gm.
2	Monopotassium phosphate (KH_2PO_4)	0.6354 gm.
3	Sodium chloride solution (0.9 per cent)	1 litre.

After sterilization in the autoclave and distribution in quantities of 10 cc. in tubes horse serum (0.5 cc.) and rice starch (one loopful) are added to each tube.

The cultures can be kept alive for longer periods than 72 hours if 0.5 cc. of buffer solution is added each day.

[Sorensen's standard phosphate buffer solution of pH 6.468 at 18°C is made as follows —

1	$\text{Na}_2\text{HPO}_4 \cdot 2\text{H}_2\text{O}$	11.678 gm. per litre.
2	KH_2PO_4	9.078 gm. per litre

Three parts of 1 to seven parts of 2.

(CLARK, W. M. The Determination of Hydrogen Ions. 1928. London Baillière Tindall and Cox, p. 210.) C M IF

DORTCH (Ch.) & DESCHENS (R.) Action comparée du sérum humain normal et du sérum humain icterique sur les cultures d'amibes dysentériques. [Comparative Action of Normal and Icteric Human Serum on Cultures of Dysentery Amoebae.]—*C. R. Soc Biol* 1937 Vol. 128 No. 33. pp. 869-872.

Employing as culture medium for *E. histolytica* coagulated horse serum slopes covered with a mixture of serum and Ringer's solution

in the proportion of 1 to 7, to which 0.05 grams of sterile rice starch had been added for each tube the authors have previously shown that the growth of amoebae is five times greater when the serum in the Ringer mixture is human serum than when it is horse serum. They have also shown that the growth in the presence of serum from cases of amoebic dysentery is only half as good as in the presence of normal human serum. In the present paper they describe tests on the action of serum from cases of jaundice which have shown that as compared with normal horse serum the growth of amoebae is six times as great. It has already been shown that amoebic growth is aided by the presence of haemoglobin so that it is possible that the related bilirubin in the icteric serum is also a stimulant. On the other hand it may be that the increased cholesterol content is responsible for the better growth. This requires investigation.

C M W

PAVLOVA (E. A.) [Factors affecting the Phagocytosis of Erythrocytes by *Entamoeba histolytica* in Cultures.]—*Med Parasit & Parasitic Dis* Moscow 1938 Vol. 7 No 1 [In Russian pp 119-122 French summary p 122.]

The author studied the effect of pH of the medium upon the capacity of *Entamoeba histolytica* to phagocytize human red cells and tested FRYE and MELENER's contention that heated horse serum favoured this phenomenon. A drop of culture medium with amoebae was mixed with a drop of saline emulsion of red cells the reaction was set at different pH by the addition of HCl NaHCO₃ or phosphate buffers and the preparations were examined at 37°C. It was found that the amoebae ingested the red cells only at pH 5.6 to 6.5 whereas no ingestion took place at higher values of pH. It is noted that this reaction corresponds to that found in human dysenteric stools and in the colon of experimentally infected kittens. The author confirmed the observation that heated horse serum when added to the medium was more favourable to the ingestion of the erythrocytes by the amoebae than fresh serum thus pointing to the presence in the serum of thermolabile factors inhibiting phagocytosis.

C A Hoare

DESCHENS (R.) Nouvelle observation de réduction du pouvoir pathogène pour le chat d'une souche d'amibes dysentériques en culture [Further Observations on the Loss of Virulence of a Strain of Dysentery Amoebae during Culture.]—*C R Soc Biol* 1938 Vol. 127 No 11 pp 939-941

The author refers to earlier experiments of various authors, including himself who have shown that the virulence of *Entamoeba histolytica* as judged by its power of producing infection when injected into the small intestine just above the ileo-caecal valve of cats is decreased by continued cultivation in artificial media. In the present paper he shows that a strain of amoeba isolated from a case of dysentery in Morocco produced infection in 50 per cent. of cats inoculated when the culture had been maintained for 56 to 124 days and in only 20 per cent when the culture period was 542 to 652 days. This loss of virulence is in the author's opinion probably associated with changes which occur in the bacteria which accompany the amoebae in the medium.

C M W

[April, 1935]

Westphal (Albert) Die Pathogenese der Amöbenruhr bei Mensch und Tier I Das Wesen der pathogenetischen Wirkursache der Ruhr amöbe. II Die Pathogenese der Amöbenruhr beim Menschen. [The Pathogenesis of Amoebic Dysentery in Man and Animals. I The Nature of the Pathogenic Action of Dysentery Amoebae. II The Pathogenesis in Man.]—Arch f Schiffs u Trop Hyg 1933. Aug & Oct. Vol 42 Nos. 8 & 10 pp 343-349 441-459 With 2 figs [41 refs.]

There are two views generally held regarding the pathological processes in tissue invaded by *Entamoeba histolytica*. One school believes them to be due to fermentative toxic action. The toxic theory is founded mainly upon the similarity of the necrotic processes in the surrounding tissues as observed in men as well as in animals.

Naturally, in assessing complicated interactions between host and parasite it is necessary to discount secondary infections and in the case of an intestinal parasite it is quite impossible to avoid them. It is only in bacteria free metastatic abscesses that the true process can be observed and even here it is not quite clear whether the bacteria were originally present or were subsequently removed by the leucocytes. The best uncomplicated picture of tissue-invasion by amoebae is to be obtained from a study of the submucosa of the human large intestine. The penetration of the muscularis is effected through various gaps in the muscular fibres. The nests of amoebae flourish in the submucosal tissues usually uncontaminated by bacteria and, as is well known, the cellular response to the presence of amoebae is minimal. The amoebae themselves lie in lacunae of histiocyte cells and it is worthy of note that this histolysis occurs in the absence of leucocytic infiltration and that necrosis follows but does not precede the amoebae. Tissue destruction is the result of fermentative processes and takes place in man and in animals in the absence of any parasites, but it is accompanied by leucocytic invasion which is singularly free from leucocytes. We are driven to the conclusion that the amoebae are capable of *extra-* as well as *extra-cellular* digestion. The formation of actual channels in the invaded tissue can only be explained on the assumption that free proteolytic ferments are produced. On the other hand no evidence is forthcoming of any toxin-production. If the amoebae were surrounded by a toxic necrosis, one would expect to find that the dead tissue could be demonstrated in the entoplasm of these parasites. On the other hand, digestion in these protozoa takes place in intracorporeal vacuoles in which usually bacteria can be demonstrated.

Further evidence of the absence of toxins is seen in the absence of fever in uncomplicated amoebiasis, as well as in the absence of toxic manifestations in the patient, such as are usually seen in association with bacillary dysentery. In a personal infection Westphal induced in his own body and in which the incubation period was 23 days [this Bulletin 1933 Vol. 35 p. 596] he did not experience the slightest toxic disturbance and even after the onset of amoebic dysentery the sense of well-being was maintained.

Absence of toxins has also been established by intravenous injections of amoebic-culture extracts in rabbits [Morewitz this Bulletin 1933 Vol. 30 p. 28 HEATHMAN Ibid p. 25] Even in extracts used by

CRAIG [this *Bulletin* 1928 Vol 25 p 228] for complement-deviation no toxins can be demonstrated but proteolytic ferments were present. Even the production of a positive complement fixation does not necessarily indicate the active presence of a toxin.

Moreover, necrosis under aseptic conditions can be brought about by the liberation of proteolytic ferments from the leucocytes.

Westphal is of the opinion that in man *E. histolytica* exists normally as a harmless amoeba (*minuta* form) in the lumen of the gut and in this stage forms cysts. The *minuta* form is nourished by osmosis and phagocytosis and the nutriment is digested in the entoplasmic vacuoles. At this stage the amoeba can excrete a proteolytic ferment and become a pathogen. The extent to which the invasion of the bowel wall takes place depends upon the tissue-resistance of the host.

The breakdown of the resistance may be in the first instance due to bacterial spoiling which causes damage to the cells and functional disturbance of the bowels. After the formation of amoebic lesions a secondary alteration of the intestinal flora takes place and this is especially liable to ensue in tropical and sub-tropical climates. It is stipulated that a change in the life cycle of the amoeba then takes place so that it is no longer able to form cysts. The following effects are noted in man —

(1) An acute bacterial disease in which the amoeba plays a small part and death occurs within a few days.

(2) Pure amoebic dysentery in which bacteria play a transient part.

(3) Chronic amoebic dysentery which is chemotherapeutically more difficult to cure.

As regards therapy it is thought that the rectal or oral administration of iatren and allied compounds can penetrate to a limited extent into the bowel wall but on deep seated abscesses or metastatic lesions it has no action at all. On the other hand the parenteral injections of emetine are diffused throughout the body and these penetrate the deeply hidden amoebae but do not touch the *minuta* forms in the bowel lumen. Rectal injections do not reach the more highly situated amoebic lesions and often result in establishing the carrier state.

So many factors are concerned in the production of amoebic dysentery that they must all concur at the same moment before an epidemic of amoebic dysentery can result and that is why it is so rare.

The sequelae of amoebic dysentery are not due to the activities of the organisms but to the scarring of the bowel wall and the dysfunctions which result from their former presence. In tropical regions where intestinal upsets commonly occur conditions are produced which favour the reproduction of *E. histolytica* and thereby virulent strains of the organism ensue whilst in temperate climates where these extraneous factors are absent amoebic dysentery becomes a relatively mild disease.

P. H. Manson Bahr

BENZONI (G.) Il problema dei portatori in amebiasi la sede nell'intestino e la virulenza dell' *Entamoeba histolytica* [Carrier Problem in Amoebiasis. Situation in the Intestine and Virulence of *E. histolytica*]. — *Patologica* 1938, Feb 15, Vol. 30, No. 556, pp. 47-52. [29 refs.] English summary (10 lines).

The paper is a general discussion of views on the pathogenicity of *Entamoeba histolytica*. It is argued that that of REICHENOW, which

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supposes that *E. histolytica* is normally a small harmless amoeba of the intestine reproducing in the lumen and producing cysts, is the correct one. Under certain conditions penetration of the intestinal wall takes place resulting in the large tissue-invading amoebae and symptoms of amoebic dysentery.

SWARTZWELDER (John Clyde) Studies on the Infection of Dogs with Trophozoites of *Entamoeba histolytica* by the Oral Route. A Preliminary Report.—*Public Health Rep.* 1907 Oct. 15 Vol. 52, No. 42. pp 1447-1451 [12 refs.] C M IV

The experiments described in this paper were designed to test the possibility of producing *E. histolytica* infections by the oral administration of trophozoites. In the first place it was determined, by sacrificing dogs 15 minutes to one and a half hours after the oral administration of 5 to 10 cc. of material aspirated from the large intestine of an infected dog, that trophozoites were able to survive in the stomach and to pass alive into the small intestine. Of 13 dogs which were given orally 3 to 7 cc. of material containing only trophozoites of *E. histolytica* five became infected, with incubation periods of 3 to 24 days. As regards the presence of free acid in the stomach it was found that viable trophozoites could occur after exposure for one hour to amounts of free HCl requiring from 12 to 40 cc. of N/10 NaOH to neutralize 100 cc. of gastric juice. It is evident that in the dog oral ingestion of unencysted amoebae may be followed by amoebic dysentery. C M IV

DESCHREWS (R.) Nouvelles données sur le rôle de la flore associée à l'amibe dysentérique dans l'amibiase expérimentale. [The Influence of the Flora associated with the Dysentery Amoeba in Experimental Amoebiasis].—*C. R. Soc. Biol.* 1908 Vol. 127 No. 12. pp 1078-1079

Continuing experiments on the lines of others which he has previously carried out the author shows here that the virulence to cats of a culture of *E. histolytica* is increased to the extent of producing infections in 45 per cent. in place of 20 per cent. of animals inoculated in the addition to the culture of a pathogenic strain of *Bact. coli*. The strain of *Bact. coli* inoculated to cats alone produced in 70 per cent. of the animals a simple enteritis which appears to be a predisposing factor in the establishment of an amoebic infection. It is noted that the amoebic infection in young cats is represented by an inflammatory and necrotic process over the greater part of the surface of the mucosa of the large intestine. It is only rarely that the deep circumscribed ulcers so characteristic of amoebic dysentery in man are observed. C M IV

DESCHREWS (R.) Le rôle de la flore bactérienne associée à l'amibe dysentérique, dans l'amibiase. [Rôle of the Bacterial Flora in Amoebic Dysentery].—*Ann. Inst. Pasteur* 1908. July Vol. 61 No. 1 pp. 5-32. With 10 figs. (4 on 2 plates) [13 refs.]

In this article the author discusses the relationship of certain groups of bacteria to *Entamoeba histolytica* in the production of amoebic dysentery a subject upon which he has made many experiments and

upon which he has written a number of papers [this *Bulletin* 1935 Vol 32 p 778 1937 Vol. 34 p 325 1938 Vol 35 p 580] In the first place clinical and epidemiological observations have suggested to various workers that bacteria play some part in enabling the dysentery amoeba to produce actual dysentery. Thus in countries or districts where the incidence of amoebic dysentery is greatest in the hot season it is then that the bacterial flora pollute drinking water most intensely. When in one country amoebic dysentery is especially prevalent in certain districts it is found that here faecal contamination of soil and water is occurring regularly. Similarly outbreaks of amoebic dysentery occurred during the great war in France and Belgium amongst groups of people who were subject to the rigours of war when in spite of the strictest measures contamination of soil and water by faecal bacteria could not be avoided. Residents in the colonies who have suffered repeatedly from amoebic dysentery on return to their homeland tend to become mere amoebic carriers without dysenteric symptoms just as symptomless amoebic carriers occur commonly amongst persons who reside permanently in the home countries. From these various observations it can be deduced that the dysentery amoeba alone is a somewhat inoffensive organism which however can be so biologically changed by alterations in the bacterial content of the intestine that it assumes pathogenic properties and produces amoebic dysentery.

In support of this point of view the author reviews a long series of experiments he has already described in earlier papers. The object of these has been to gauge the pathogenicity of certain culture strains of amoebae by observing the percentage of 20 cats acquiring amoebic dysentery when inoculated directly into the ileum exposed by laparotomy. Having established this percentage which in the case of some strains was low the bacterial content of the culture was altered by transferring to it the bacteria from more virulent strains. It was possible then to determine that the percentage of animals contracting dysentery had considerably increased. By a long series of experiments carried out by the standard technique which was first introduced by FRYE and MELENEY in 1933 [this *Bulletin* 1934 Vol 31 p 284] and which the author describes in detail in this paper it was possible to demonstrate that certain bacteria or groups of bacteria enable *Entamoeba histolytica* to give rise to amoebic dysentery. The study of the pathological anatomy of the intestine in amoebic dysentery reveals in the destructive process a bacterial element in addition to an amoebic one without however enabling one to decide which of these is to be regarded as the primary cause. It seems safe to conclude however that the intestine can be prepared for amoebic invasion by bacteria.

The paper is a long and carefully reasoned one and exposes fully what may be regarded as the modern view of the etiology of amoebic dysentery.

C M IV

DESCHIEUX (R.) Le rôle des bactéries dans l'amoebiose intestinale [Rôle of Bacteria in Intestinal Amoebiasis].—Reprinted from *Paris Méd* 1938 June 4 8 pp

This is a general account of experiments carried out by the author to demonstrate that just as dysentery amoebae require bacteria to enable them to develop and multiply in the culture tube so do they depend

[April, 1909]

on certain pathogenic bacteria to enable them, when in the intestine, to penetrate the intestinal wall and produce the conditions which are grouped under the term amoebiasis. The various papers describing these results have already been reviewed in earlier numbers of the Bulletin.

DESCHIEUX (R.) & DECORRY (Ph). Action favorisante d'une colite toxique sur l'adaptation pathogène de l'amibe dysentérique [Pathogenicity of Dysentery Amoeba favoured by a Toxin Colitis].—*C. R. Soc. Biol.* 1908 Vol. 128 No 23 pp 1018-1019

One of the authors has shown by previous experiments that the establishment of a colitis in kittens by the administration of certain bacilli, living or killed, favours the development of amoebic infection when cultures of *E. histolytica* are injected directly into the small intestine after laparotomy according to the authors' technique. In the present paper experiments are described which indicate that a colitis caused by an irritant such as croton oil likewise favours the establishment of the dysentery amoeba in the cat's intestine.

GAUDICHEAU (A.) Sur la pathogénie de l'amibiase [Pathogenesis of Amoebiasis].—*Bull. Soc. Path. Exot.* 1907 Oct. 13 Vol 30 No 8 pp. 858-859.

The author mentions his experience with a dog and a monkey which were experimentally inoculated with a bacillus and a virus. In both cases the injection transformed a latent amoebic infection into an active amoebic dysentery. A cultivable free-living amoeba has been shown to grow actively only in the presence of certain bacteria, while its power of phagocytizing staphylococci depends upon the simultaneous presence of *Bact. coli*. It is obvious that both pathogenic and free-living amoebae depend upon certain bacteria for their satisfactory development.

SARKISJAN (M. A.) [Pathogenicity to Kittens of Various Strains of *Entamoeba histolytica* from Healthy Human Carriers].—*Med. Parasit. & Parasitic Dis.* Moscow 1908 Vol 7 No 1 In Russian pp 123-128. French summary p 123.

Experiments were conducted with the view of verifying the existence of virulent strains of *Entamoeba histolytica* such as "E. dispar." Four strains of amoebae were isolated from different persons whose present and past history showed no symptoms of any intestinal disorder. Kittens were inoculated *per os* (4) with washed cysts from the faeces and *per rectum* (22) with cultures. Out of 26 kittens, infection resulted in 6 (2 1 1 2 with the respective strains). The passed amoebae with ingested red cells, while the histopathological picture was similar to that found in kittens infected from human dysentery cases. It is concluded that the amoebae from symptomless carriers are identical with the pathogenic *E. histolytica* from which they are morphologically indistinguishable.

C. A. Howe

FRYE (William W) & MELEKEY (Henry E) The Pathogenicity of a Strain of Small Race *Endamoeba histolytica*—*Amer Jl Hyg*, 1938 May Vol 27 No 3 pp 580-589 With 5 figs. on 1 plate. [14 refs]

The paper discusses the strains of *E. histolytica* which produce cysts under 10 μ in diameter. The observations recorded were based on stool examinations carried out in the Department of Preventive Medicine and Public Health of the Vanderbilt University School of Medicine during the years 1930-1937. The specimens examined 9 449 in number gave 325 or 3.44 per cent positive for *E. histolytica*. Of these 85.2 per cent. were the large race with cysts over 10 μ in diameter 13.5 per cent were the small race and 1.2 per cent were mixed large and small races. It is noteworthy that before the beginning of 1935 only seven instances of infection with a small race were detected whereas since then there have been found 37 cases. It was not possible to account for this increased incidence which was a real one. One of the small races was successfully cultivated. During maintenance by subculture the amoebae remained constantly small in size and showed no tendency to ingest red blood corpuscles when these were added to the medium. The few cysts which were produced in cultures were constantly small in size. Culture was injected into the terminal ileum after laparotomy in 22 kittens only five of which became infected. The amoebae which were small in size showed less tendency to invade the tissues than did large races such lesions as were produced being very superficial in character. Complement fixation tests carried out with a large race antigen on 14 carriers of small race amoebae gave a positive result in five. The patient from whom the small race was cultivated gave a positive complement fixation reaction which became negative after treatment. It is concluded that a small race of *E. histolytica* exists which is relatively fixed in its size and activity and that it possesses a low power of invasion of the tissues of man and experimental animals.

C M W

WILKINSON (W) An Investigation Into the Value of Sigmoidoscopy Examination as an Aid to Diagnosis of Chronic Amoebic Infection in Man.—*East African Med Jl* 1938 Dec. Vol. 15 No 9 pp 295-299

The author has analysed a hundred patients with abdominal complaints of considerable duration examined by sigmoidoscope either by himself or by Dr BRAIMBRIDGE during the past year. He divides his cases into two groups according as there were clinical signs of amoebiasis or not. Of the former there were sixty. Twenty were found to have a normal mucosa, 17 an extensive hyperaemia, 3 had haemorrhagic areas 12 had ulceration and 8 leucoplakia. Details of the findings in each of these subgroups are given. *E. histolytica* was found in 17 of the 60 and the author concludes that no case of amoebiasis was discovered by sigmoidoscopy which had not been diagnosed clinically or by examination of the stools and that consequently in chronic cases sigmoidoscopy is of value as confirmatory in a small proportion only.

H H S

BOVENIGRO (A.) La coltreazione all'istadina nella colite amebica. (Cutaneous Histidine Reaction in Amoebic Colitis).—*Riv. Sanitaria Sicilia* 1938, Vol. 15, No. 22, pp. 1279-80. 1283-4 1287-8 1291-2, 1295.

For this test the author employs 0.1 cc. of a 10 per cent. solution of histidine. The immediate result is local pallor of 0.3 cm. diameter in positive cases after 1-2 minutes a reddening appears over the area of a 20-lire piece and lasts for 40-45 minutes and often shows dendritic prolongation at the periphery. If the reddening is not observable in 5-8 minutes, the reaction is regarded as negative. The author has studied the reactions in 72 cases and finds that in chronic amoebic colitis the skin reacts to amino-acids with greater intensity than in cases of gastro-enteritis, or non-amoebic infections. treatment of the condition reduces very greatly this reaction, and it is inferred that in chronic amoebiasis of the intestine there is a distinct affection of general and local protein metabolism.

PARTSON (Moses) & ANDREWS (Justin) Complement Fixation in Amoebiasis. A Comparative Evaluation in Clinical Practice.—*Arch Intern Med* 1938, Apr Vol. 61, No. 4, pp. 552-573. (13 refs.) H H S

The authors have attempted to estimate the true value of the complement fixation test as a diagnostic procedure for amoebiasis. Sera from 150 cases which had been studied clinically and parasitologically were submitted to one or more laboratories where the amoebic complement fixation test was being carried out with one or more antigens. When the results were tabulated it was found that the positive results occurred more frequently amongst those cases in which amoebic infection had been determined macroscopically than in others but the numerous falsely positive results show that the test is unreliable in the individual case. It is pointed out that the test as carried out at present is merely a diagnostic aid and that in spite of the many disadvantages of macroscopic faecal diagnosis this method is still more reliable than complement fixation. CALVO, who has done so much to develop the complement fixation test for amoebiasis, has admitted that when adequate faecal examinations can be carried out the test is unnecessary.

KAIG (Charles F) & SWARTZWEIDER (John Clyde). Observations upon the Complement-Fixation Test in Monkeys Infected with *Entamoeba histolytica*.—*Proc. Soc. Exptl. Biol. & Med* 1938, Jan Vol. 37, No. 4, pp. 671-673. C M W

MELLEVET and FITE (this Bulletin, 1938 Vol. 35 p. 583) have reported that monkeys (*Macacus rhesus*) naturally or experimentally infected with *Entamoeba histolytica* did not give complement fixation reactions with one exception, and showed no macroscopic or microscopic lesions at autopsy. The authors of the present paper noted that a monkey infected with a human strain of *E. histolytica* consistently gave a four-plus complement fixation reaction for amoebiasis. To investigate the matter further a strain of *E. histolytica* occurring naturally in a monkey was used to infect three other monkeys. This monkey

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strain was identical morphologically with strains occurring in men while cysts fed to a dog produced infection associated with typical lesions in the caecum and colon. The three monkeys which were infected by feeding them with cysts all gave a positive complement fixation reaction. All the four monkeys were examined post mortem and lesions in the caecum and colon were found in three. The one exception was an animal in which the complement fixation reaction had become doubtful 27 days before death. In view of the previous positive reaction it seems probable that this monkey was recovering spontaneously. C M II

JANSON BAIER (Philip) Amoebic Invasion of the Skin and Subcutaneous Tissues.—*Trans Roy Soc Trop Med & Hyg* 1938 Aug 25 Vol. 32. No 2. pp 223-227 With 5 figs on 1 plate. [28 refs.]

The case described is that of an ex-soldier from India aged 25 years on whom colostomy was performed owing to the sigmoidoscopic appearance of the rectum suggesting carcinoma. Extensive ulceration of the abdominal wall around the colostomy opening followed. Ultimately *Entamoeba histolytica* and trichomonas were found in the discharge from the ulcerated area. Amoebae were also found in portions of the tissue removed from the ulcer while amoebic ulceration of the rectum was observed by sigmoidoscopy. Response to emetine treatment was immediate though final recovery was delayed by complications such as perforated appendix, pelvic abscess and pneumonia. Finally after a course of auremetine and yatrein which rid the patient of his persisting amoebic infection the colostomy wound was successfully closed. C M II'

PIERI SARDOU & BOUDOURESQUE Maladie kystique du poulmon chez un amibien. [Cystic Disease of the Lung in a Case of Amoebiasis] —*Bull Soc Path Exot* 1937 Oct 13 Vol 30 No 8 pp 659-664

A patient who had on two occasions suffered from amoebic abscess of the liver was again admitted to hospital for an obscure condition of the lung which was ultimately diagnosed as pulmonary cyst rupturing into the pleural cavity. On no occasion was it possible to demonstrate amoebae in the material coughed up or aspirated from the pleural cavity nor did any response to emetine treatment occur. The clinical aspects of the case are discussed in some detail. C M IV

WU (S D) Amoebic Infection of a Nasopharyngeal Polyp.—*Chinese Med J* 1938. Mar Supp No 2. pp 217-220 With 2 figs. on 1 plate [19 refs.]

The specimen examined was from a tumour the size of an orange removed from the back of the nose of a Chinese, aged 28 years. Its structure was that of a muco-fibrous polyp with localized areas of ulceration and in the necrotic patches with granulation tissue were fusiform bacilli and amoebae. Unfortunately all material available for examination had been sent in formalin so there was no opportunity to examine living amoebae from fresh material. No history could be obtained of amoebiasis, the patient's stools were free of amoebae or their cysts. Since fusiform bacilli were present also the ulceration

cannot be attributed solely to the protozoan. The question arises as to whether the amoeba was *A. histolytica* or *gargalis*. Bacteria were found within them in this case—a point more in favour of *gargalis* but red corpuscles were also found—a point in favour of *A. histolytica* and strongly against *gargalis*. They measured from 8-17 microns in diameter. Since only preserved material was available no final decision could be made. H H S

LOUBEYRE (J) TOLLIER (H) & FOISSAUX (J) Polynévrite des membres inférieurs apparue au décours d'une paratyphoïde B et d'une amibiase intestinale, et guérie par un traitement émétiq. Neuritis in Association with Paratyphoid Fever and Intestinal Amoebiasis cured by Emetina. *Bull. et Mém. Soc. Méd. Hôp. de Paris*. 1938. Dec. 12. 54th Year 3rd Ser. No. 33. pp 1702-1708

A commercial traveller 32 years of age suffered from an attack of paratyphoid B and neuritis of the legs, and some months later had a haemoptysis. There was no sphincter involvement. No cause was discovered for this haemoptysis, but on a subsequent occasion a diagnosis of "pulmonary hepatic and intestinal amoebiasis" was made when diarrhoea, 8-10 stools a day led to faecal examination and discovery of *E. histolytica*. Electrical treatment had failed to benefit the paralysis but on the exhibition of emetine for the amoebiasis the paralytic symptoms also cleared up. The authors note that GRALL DIOT (in Morocco) and ROGER (of Marseilles) have noted that polyneuritis does occur as a complication—though a rare one—of amoebiasis. H H S

ENDERLE (Lario) Sindromi neuropsichiche nella amebiasi cronica (Nervous and Mental Syndromes in Chronic Amoebiasis). *Arch. Ital. Sci. Med. Colon e Parasit.* 1938. Sept. & Oct. Vol. 18. Nos 9 & 10. pp 513-558 5 refs. H H S

SAUTET (Jacques) A propos des abcès amibiens du foie (Amoebic Abscess of the Liver). *Rev. Prat. Malad. des Pays Chauds*. 1938. July 17th Year Vol. 18. No. 7. pp 323-4 327

The author stresses the fact that obscure hepatic conditions in the tropics and subtropics are probably more often due to *E. histolytica* than is generally believed. The fact of the pus from a liver abscess being sterile or in an earlier stage, a hepatitis of obscure origin should lead to a very careful and, if necessary, repeated examination of the faeces. It is not, he thinks, sufficiently appreciated that cysts may be found and hepatitis and even abscess occur without there being a history indicative of a previous attack of true dysentery. H H S

HUARD (P) LONG (M) & GRAEYAT (R) Réflexions sur une nouvelle série de 48 abcès du foie. (Reflections on a Further Series of 48 Liver Abscesses). *Rev. Méd. Française d'Extrême-Orient*. 1938. Mar. Vol. 18. No. 3. pp 170-217 [Refs. in footnotes.]

This is a valuable paper emphasizing that in Indo-China a large proportion of abscesses of the liver show primary or secondary bacterial infection, necessitating more frequent resort to open operation and drainage.

The authors now add records of 48 new cases to the 150 previously recorded by them. They quote figures of 99 cases in eight years in Tonking as well as data from other countries. They also quote evidence that some cases are caused by bacterial infection and not by amoebae and the former appear to be more frequent in Indo-China than in India and elsewhere. Such bacterial and especially streptococcal and staphylococcal infections may be secondary to amoebic abscesses. They also note that such organisms may be found by haemoculture. A table of the data of seven series of cases by other workers in the Far East shows 90 amoebic and 7 non-amoebic cases but the author's own figures showed among 42 Tonking cases only 3 amoebic and 39 non-amoebic cases. Such a remarkable difference has naturally led them to adopt different treatment from that found most effective in other countries. They quote the old French contention that the amoebae carry to the liver the bacteria that cause the abscess although the reviewer has never seen any explanation of why such septic organisms die out of the liver alone and leave so many amoeba-containing abscesses sterile as regards bacteria. They also refer to other very rare causes of liver abscess such as worms distoma gallstones and hydatids.

The symptoms are next discussed and the frequency of different signs recorded in accordance with general experience. The rarity of definite jaundice is emphasized except that due to pressure of a large abscess on the hepatic ducts as in the case quoted from ROGERS. More important are the complications met with which are discussed at length. Intraperitoneal perforation may be spontaneous or follow on puncture or drainage operations and the authors quote published records of cure obtained in sterile cases by simple aspiration of the abdominal pus combined with emetine treatment which they will be tempted to try in future. Recent data collected by SANTAVELLI showed in localized peritoneal infections 13 cures and 9 deaths and in generalized ones 5 cures and 18 deaths. In a table of 690 liver abscess cases they record 88 with rupture into the peritoneal cavity. Multiple and recurring abscesses are next dealt with and their serious import noted.

Under diagnosis they record further successful use of the method of injecting lipiodol collargol or tenebryl into the abscess cavities, to detect their extent and complications through spread to neighbouring organs such as the lung or some part of the gastro-intestinal canal.

The results of treatment in a number of eastern countries are summarized in Table 7. They show great variations in the mortalities but only two deal with a considerable number of cases. The very high death rate of 80 to 90 per cent in the non amoebic cases of Yoshitake is noteworthy. The Indian Army with only 12 per cent mortality among 83 cases doubtless largely in amoebic cases presents a great contrast. In an analysis of their own cases the authors point out that nearly all their fatalities occurred in cases showing bacterial infection, and very few in purely amoebic cases. This is in accordance with Indian experience. Owing however to the much larger proportion of bacterial infections in their series they naturally adopted the open operation as a rule. In cases suitable for emetine treatment they prefer to give the drug intravenously. They find adrenalin of value as a safeguard to the heart against the depressing effects of the former drug.

Tropical Diseases Bulletin.
Table showing the Mortality from Liver Abscess in Various Statistics of
Indo-China and the Far East.

[April, 1935]

Sources	Number of abscesses observed	Number of Deaths
Military statistics from the Dutch Indies (1934-1936)	17	3 (17 per cent.)
Military statistics from the Dutch Indies (1920-1925)	268	76 (28.7 per cent.)
Military statistics from British India (1930-1935)	83	10 (12 per cent.)
Military statistics from British India (1935)	4	1 (25 per cent.)
Chang and Robertson (aspiration cases)	8	1 (11 per cent.)
Chang and Robertson (operation cases)	14	2 (14 per cent.)
Chang and Robertson (total)	34	4 (9 per cent.)
Yoshitake	Non-amoebic abscesses	60 to 80 per cent.
	Amoebic abscesses	20 per cent.
Malaria (total)	Amoebic abscesses	3 (15.6 per cent.)
Malaria (operation cases)	19	2 (50 per cent.)
Malaria (aspiration cases)	4	1 (20 per cent.)
	5	

L. Rogers

Wijerama (E. M.) *Tropical Abscess of the Liver.*—*J. Ceylon Branch Brit Med Assoc* 1933 Mar Vol 35 No. 5 PP 263-267

During a period of 21 months among 4,070 patients admitted to the author's wards were 48 with liver abscess, i.e. about 12 per mille. Those in the fourth decade were twice as numerous as in any other corresponding period only one was under 20 years, eight between 20 and 30 years and for the succeeding decades 19, 10 and 10 the oldest patient being 58 years. All, without exception, were males. A history of previous dysentery was obtained in thirty-four (but the interval between the dysentery and the onset of symptoms of liver abscess for hepatitis) is not stated. It is interesting to note the treatment adopted. Forty-three received injections of emetine only adults 1 grain daily for twelve days with an interval of two days between the sixth and seventh injections. Four patients were aspirated as well as being given emetine one being aspirated once two twice and one three times. These forty-seven all did well. One patient was transferred to the surgical ward and died after operation. H H S

Prinks (M. V. P.) *Tropical Abscess of Liver.*—*J. Ceylon Branch Brit Med Assoc* 1933 Sept. Vol 35 No. 5 PP 381-384.

The author's remarks are based on a very small number of cases, 28 and he excludes the inflammatory condition preceding actual abscess. [It is a pity that with so small a total as 28 percentages are given throughout in place of actual figures they are very apt to mislead.] Eighty per cent. [22 cases] were of obscure onset with moderate fever up to 101°F only no sweats or rigors a history of dysentery

or diarrhoea was obtained in less than half 45 per cent. [? 13] The author found that alcohol in moderate quantities was taken by 24 per cent. [? 6 or 7] and concludes that it is likely that toddy was the medium of infection in these cases. He adduces however no other evidence for this generalization. Pain in the right upper abdomen was present in 60 per cent. [? 17 cases] tenderness over the liver in 95 per cent. jaundice in 4 per cent. [presumably a single case]. Sweats were uncommon loss of weight marked with large collections of pus leucocytosis ranged from normal to 18 600 per cmm with an average about 12 000 pus withdrawn usually sterile.

The author recommends the giving of emetine for three days before aspiration is undertaken. He warns against the use of the knife for incision of the liver over an abscess because of the risk of uncontrollable haemorrhage also of a long needle for exploring because of the danger of puncturing the inferior vena cava.

The commonest complication of untreated abscess was rupture. Of twelve such cases under the author's observation four ruptured into the lung and pleura two through the chest wall two into the peritoneum and four through the abdominal wall. He states that abscesses rupturing into the peritoneum set up acute and extensive peritonitis although ordinary pus-forming organisms were absent and proved invariably fatal if operative treatment was undertaken early and shock was profound. Nevertheless at exploratory laparotomy two such cases were found to be ruptured tropical abscesses. Both patients recovered when the matter in the peritoneal cavity was mopped out and the abdomen was drained. [These statements are not easy to reconcile is a negative omitted from the first?]

H H S

BROWN (Philip W) & HODGSON (Corrin H) Late Results in Treatment of Amebic Abscess and Hepatitis of the Liver — *Amer Jl Med Sci* 1938 Sept Vol. 196 No 3 pp. 305-313

This is an important contribution from the Mayo Clinic to the incidence of amoebic hepatitis and liver abscess in the North Temperate Zone climate of the United States.

Invasion of the liver by amoebic infection from the large bowel is a serious affection as shown by the high mortality prior to the introduction of the emetine treatment. A review of 18 years Mayo Clinic records shows 18 actual cases of liver abscess and 17 with clinical signs of hepatic involvement. The amoeba was found to be the cause in 18 (14 per cent.) of 125 liver abscess cases in this temperate zone area. Only 4 of the 35 cases were in women and these were all among the 17 non-surgical cases none of the 18 surgical cases were females. Even a history of diarrhoea was absent in 8 of the 35. Pain in the lower right thorax was the most frequent symptom it also occurred in the right shoulder in 8 and in the left in one. Fever was present in all but four. Leucocytosis is present but may be minimal during a quiescent phase. Tenderness on pressure over the liver is common. X-rays may reveal liver enlargement and fixed right diaphragm. The stools were positive to amoebae in 26 cases and in 8 more that organism was found in the liver abscess pus. Three cases were recognised by the characteristic response to emetine. In 7 of 17 proctoscopic

[April, 1935]

with a six day interval between them. Up to one year 5 mgm. a day up to a total of 5 cgm. from 1 to 2 years, 1 cgm. daily total 10 cgm. from 3 to 5 years 2 cgm. a day total 20 cgm. from 6 to 9 years, 3 cgm. daily total 30 cgm. from 10 to 13 years, 4 cgm. daily total 40 cgm. For the last age group five weeks for the others four weeks suspension of emetine treatment is observed after the last dose. The doses mentioned refer to the hydrochloride of emetine for other compounds the dose is proportional to their emetine content. In the acute stage of bismuth and emetine or auremetine (28 per cent of emetine) are given in capsules. Of the latter he gives four capsules of 1 grain each daily up to a total of 60 grains. Congestive amoebic hepatitis yields rapidly to emetine and he is convinced that typical hepatic abscess may undergo resorption under this treatment.

That failures with emetine treatment occur he allows. Apart from cases treated with insufficient doses mixed infections of bacterial and amoebic dysentery and cases complicated by a *Leishia* or other protozoal infection he finds that 5 per cent of acute cases resist emetine. In such cases arsenicals must be employed. Insufficient dosage with emetine—less than 6 cgm a day in the adult—produces emetine-resistant amoebae. The author finds that anaphylactic symptoms are not infrequent in attendants and pharmacists but rare in patients. They are vesiculo-erythematous rashes of face and hands. In the sick extensive erythema oedema and arthralgia have occurred in patients previously treated with ipocuanha. As to whether it is permissible to speak of cure the author is very reserved. A useful paper deserving of careful study by those practicing in the tropics.

J B Davy

HAKANSSON (E G) On the Effectiveness of Carbarbons as a Remedy for Amoebiasis.—*Am J Trop Med* 1933, May Vol. 18, No 3 pp 245-269 [24 refs.]

A careful analysis of the results obtained in 43 cases of amoebiasis by treatment with Carbarbons given in capsules by mouth.

The cases are separated into four groups in which varying dosage was employed—(i) 12 gm. in four weeks (ii) 18 gm in five weeks (iii) 11 25 to 16 gm in ten days (iv) 5 to 10 gm in ten days. In the last two groups dosage was proportional to body weight. In all cases divided doses two or three times daily were given after meals. The cases comprising groups (i) to (iii) were asylum inmates those in group (iv) laboratory technicians and their families. Among the former were six of acute dysentery the rest were all carriers.

The patients were on ordinary diet and no other drugs were employed except for a few of the acute cases in which exhaustion compelled rest in bed, the patients were up and about.

During the twelve months following treatment, at least 31 thorough microscopical examinations of the faeces of each case were made. The sugar flotation method of YORKE and ADAMS was employed when examining stools of normal appearance. The test of cure was therefore, a stringent one.

In one instance only were toxic symptoms seen. This was a woman weighing only 88 lbs. who developed jaundice and glycosuria after a course of 10 gm. in 23 days. The toxic symptoms cleared up in a fortnight.

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There was no vomiting complained of by one patient. The faeces were negative throughout the year of observation. 19 of the 43 cases following treatment and in one of seven submitted to a second course of treatment after relapse. The intensive 10 day courses gave the best results. All the cases in group (iv)—laboratory technicians and their families—passed the test although a low dosage was employed in this group.

As Hakansson points out it is probable that some of the failures in the asylum cases were actually reinfections for no precautions against this were possible and an earlier survey by C M Jönsson revealed that there was an *E histolytica* incidence among the inmates of this asylum of 35 per cent.

The immediate result in carriers was the disappearance of cysts from the stools in three days. In the acute cases the stools were free of *E histolytica* and of blood and mucus in two to four days. Hakansson is rightly cautious in drawing wide conclusions from this small but exhaustively investigated series of cases and concludes his paper with useful suggestions on the precautions to be observed in prescribing this valuable drug.

J B Darcy

GRASSO (Rosario) Sul valore terapeutico dell'acido p carbamidico fenalarsonico (Fenarson) nella colite amebica (Fenarson in Amoebic Colitis)—*Riv Sanitaria Siciliana* 1933 Aug 15 Vol. 26 No 16 pp 921-930 [10 refs]

Fenarson is the Italian equivalent of Carbarsone. The author has employed it in treating forty patients giving 50 cgm daily for ten days. He found that the entamoeba both vegetative and cystic forms disappeared early it might be in two days but usually within a week. Twelve of the patients examined at intervals up to eight weeks afterwards were still found negative and the drug was well tolerated by all.

In discussing the dosage the author states that American physicians prescribe for an adult 75 mgm per kilo body weight over a period of three weeks the minimum and maximum doses found effective being 29 and 204 mgm per kilo without giving rise to toxic symptoms. The general dosage recommended is 75 mgm per kilo over a period of at least ten days and given in two doses a day. It has proved efficacious but not so completely in infections by *E coli*, *E nana*, *Iodamoeba butschlii*, *Chilomastix* and *Giardia*. [See also this Bulletin 1934 Vol. 31 p 282 1936 Vol. 33 p 543] H H S

PYMAN (F L.) Chemotherapy of Amoebicides.—*Nature* 1937 Nov 13 Vol. 140 No 3550 pp 832-834 [10 refs]

In this paper the author reviews work that he has carried out on derivatives of harmol with a view to the discovery of amoebicidal drugs. The various derivatives were tested on cultures of *E histolytica*. A series of compounds of the general formula $RR'N(CH_2)_xNRR'$ was prepared and it was found that of these the most active were α -tetra n -amylidiaminodecane ($R,R' = n$ -amyl $x=10$) and α -tetra- n -butylidiaminodecane ($R,R' = n$ -butyl $x=10$). The first of these in

to 1923 which was the last year in which epidemic plague occurred. Many interesting statistical facts are recorded in tables—table I standardized death rates for census years and crude death rates for each year table II age-mortality of plague deaths in 1901 because this was a census year table III plague deaths expressed as a percentage of deaths from all causes in their age groups and table IV seasonal distribution of plague 1894–1923. Other tables follow with calculated coefficients of correlation between plague and the five main climatic factors—relative and absolute humidity monthly mean temperature, rainfall, and barometric pressure. It is not easy to ascribe the diminution in the severity of plague to improved sanitation since the severity of plague has diminished everywhere in South China with or without sanitation betterment. Conclusions are come to which appear somewhat contradictory—

“Climatic conditions favour the spread of plague in Hong Kong in the spring and early summer. When the mean temperature rises to 83° the relative humidity to 83° and the tension of aqueous vapour to 0.500, epidemics are likely to occur. When these factors approach respectively the values of 82° , 83° or more for three to four months and 0.900, the disease tends to die out. Inasmuch as these factors have often prevailed in non-epidemic years, and indeed when there has been no case of plague

it is necessary to look for other causes which may govern the appearance of plague either in epidemic or sporadic form in Hong Kong.”

W F H

Buxton (P. A.) Quantitative Studies on the Biology of *Xenopsylla cheopis* (Siphonaptera)—*Indian J. Med. Res.* 1938. Oct. Vol. 26 No. 2. pp. 505–530. With 3 figs. & 2 graphs. [22 refs.]

The biology of tropical rat-flea has been studied by insect physiologists under laboratory conditions and the “flea count” in the field has been thought to provide a rough guide to the state of natural populations from time to time. But more exact studies in population growth, making use of laboratory technique for breeding the fleas and the control of climate though leaving the rodent-flea relationship as natural as possible, have only recently been attempted. The present paper describes the results of 27 experiments made in order to discover the climatic conditions under which fleas live and multiply most easily.

The apparatus, which is quite new and which with slight modifications may perhaps be used for other problems, is described in great detail. It consists essentially of a “synthetic mouse-hole”—a rectangular glass chamber 18 cm. \times 12.5 cm. \times 13 cm. with a copper lid waxed into position and carrying inlet and outlet pipes for air thermometer hygrometers, etc. Into this chamber which is kept in an incubator at constant temperature, are placed a mouse and its bedding together with the fleas (*Xenopsylla cheopis*). Air brought to the required humidity by either KOH or H_2SO_4 solutions is passed through the chamber. Many difficulties in the control of humidity have been overcome and are described. Among other precautions it is necessary to use a mouse of standard weight and to maintain a constant rate of air flow. Then in spite of the water given off by the mouse it is possible to control humidity so that there is no more than an 8 per cent. variation in different parts of the chamber. It is thought that the humidity in the bedding is very little in excess of that of the atmosphere above it.

When the mouse has occupied the apparatus for three days adult fleas, from 15 to 50 of each sex, are introduced (P (parental) generation). They feed on the mouse and breed in the bedding. After a definite period from 7 to 18 days in these experiments the fleas are counted and the bedding incubated at the temperature and mean humidity of the experiment until all the first filial generation (F) adults have emerged. Many P fleas are eaten by the mouse but assuming their decrease to be logarithmic an estimate of the number surviving at any day can be made and experiments of different duration compared. It is stressed that owing to the small number of experiments the conclusions are tentative they may be briefly summarized as follows —

P generation

A high mortality is due to fleas being eaten by the mouse but survival was affected neither by temperature nor humidity over the ranges used (24° to 32°C. 30 per cent. to more than 90 per cent. R.H.) It is thought that in dry air water loss is compensated by frequent blood-meals. The original density of population has no effect on the proportion surviving. When an experiment is concluded the proportion of fleas on the mouse is determined. This may vary between 4 per cent. and 23 per cent. of the total and it is affected neither by temperature nor humidity. When the sexes are present in equal numbers significantly more females than males have been found on the mouse.

Production of F fleas

Eighty per cent. of the emergences occur between the 24th and 33th day after the commencement of the experiment and they tend to be sooner at higher than at lower humidities. The production of F fleas per P♀ day is greater at higher humidities and at high temperatures. At very high humidities mould appears and there is a total mortality in the F generation. It is probable that low humidity is unfavourable during larval life when spiracular control is less efficient and when water may be lost through the cuticle. Possibly the larvae feed only when the proportion of water in the bedding exceeds a certain value.

In conclusion the author calls for a more critical study of the flea count for his experiments suggest that as yet it gives no reliable estimate of the fluctuations in the total flea population since it assumes that the population of fleas on the rat bears a constant relation to the total population. It is urged that the climate in rat-holes and harbourages should be studied, for it would be interesting to know if mortality of fleas is high in nature in view of the nearly saturated atmosphere found by the author in rat-holes [this *Bulletin* 1932 Vol. 29 p 838].

It is important to know also about the temperature in the holes since fleas may possibly tolerate a drier atmosphere at the higher temperatures for then the adult stage with its greater tolerance of humidity variations is reached more quickly.

It is hoped too that the "synthetic mouse-hole" will be used in the future with rats and that the period of the experiments will be extended to cover the whole life of the P generation. Very high relative humidities should be studied, with a drainage system (plaster of Paris on

the floor of the chamber?) similar to those occurring in natural rat holes. The use of baby rodents has also been tested the mortality among adult fleas is then very slight (but we understand that the fleas lay few eggs)

C G Johnson

RAMOS DÍAZ (Arquimedes) Epidemiología de la peste bubónica en la sierra del Departamento de Lambayeque. [Epidemiology of Plague in the Mountainous Region of Lambayeque.]—*Boletín Semanario Panamericano*. 1938 Sept Vol. 17 No. 9 pp 778-781

A small epidemic of plague occurred in a small village in the mountainous region of Lambayeque in Peru. It has formed the basis of a study of the mode of transmission of plague in that district. The disease was proved to be human plague by disintering the body of a fatal case two months after burial and examining the bone marrow from a rib microscopically by culture and by animal inoculation. In the region of the epidemic the presence of *Rattus rattus* which is the common reservoir of plague on the Peruvian coast, has been demonstrated together with its plague vector *X. cheopis*. In the mountains however rodent plague is found in the *cui*, a species of guinea pig. Contact is made between *cui*s and rats, which accounts for epizootics in the former. Now the flea *Pulex irritans* has adapted itself as a parasite of the *cui* and it is this flea which is considered to have transmitted plague in this instance to human beings.

W F H

LAUBAUER (E.) Rapport sur la peste dans l'île de Hainan. [Report on Plague in Hainan.]—*Bull Soc Path Exot*. 1938 Oct 12 Vol 31 No 8 pp 752-760

GRAND (G.) Identification du bacille pesteux par l'inoculation au cobaye des séroités de ponctions diluées dans l'eau salée (à propos des remarques formulées par M. BROQUET). [Identification of the Plague Bacillus by Inoculation of the Guinea-pig with Puncture Material Diluted with Salt Solution.]—*Bull Soc Path. Exot.* 1938, July 6 Vol. 31 No 7 pp 660-677

The point made in this communication and illustrated by experimental data is that more certain and quicker results are given by subcutaneous injection of a suspension of test material in salt solution than by application to the shaved skin. One advantage of the salt solution over more nutrient fluids is that post-mortem organisms do not multiply in it.

W F H

ESKRY (C. R.) Fleas as Vectors of Plague.—*Amer Jl Public Health* 1938, Nov Vol. 28, No 11 pp 1305-1310

Many important data regarding the conditions under which plague is transmitted to man by fleas are contained in this article. These are presented in condensed form and can only be still more concisely summarized.

It is only shortly before the death of an animal that the blood septicaemia is sufficiently intense to infect fleas. In the flea itself which has taken up plague blood, infectivity is not developed as long

as that blood can still pass into the stomach. Only the "blocked" flea—that is one in which bacterial proliferation has occurred in the proventriculus with obstruction—is infective by the regurgitation of organisms into the wound made by the insect bite. In the course of experiments fleas have transmitted plague as early as five days and as late as 147 days after they had ingested *P. pestis*. On the other hand the period of infectivity is short for the flea does not usually survive obstruction more than 24 to 48 hours.

The species of rat flea *Xenopsylla cheopis* is the most active and dangerous of the flea vectors but *Nosopsyllus fasciatus* is also highly capable of transmitting plague. Although all species of fleas do not have the same ability to transmit plague it is probable that any flea regardless of species feeding on septicaemic blood may become infected and may be a potential vector.

It used to be held that man might be infected with plague by means of flea faeces rubbed into the wound. While this view has been discarded for man in favour of regurgitation infection, it probably holds good for the rodent and it is well to remember that *P. pestis* may retain its virulence as long as four weeks in dried faeces.

Sylvatic plague has assumed considerable importance of recent years for epizootic spread and yet there is little knowledge regarding the facility with which wild rodent fleas will attack humans. It would seem probable that all rodent fleas have to be starved before they prefer human blood to that of their natural hosts and that wild rodent fleas are not nearly so dangerous to man as the domestic rat fleas *Xenopsylla cheopis*. W F H

MAYFIELD (R. B.) Rat-Fleas in Plymouth.—*Parasitology* 1938
Sept Vol. 30 No 3 pp 314-319 With 1 fig

The investigation related only to a certain section of the docks in Plymouth which were separated by town dwellings from other dock premises. More extensive surveys in Liverpool have shown that *Xenopsylla cheopis*, *Nosopsyllus* (*Ceratophyllus*) *fasciatus* and *Leptopsylla musculi* were the prevalent species there. In London the most common species was *Nosopsyllus fasciatus* although *Leptopsylla musculi*, *Ctenophthalmus agyricus* and *Ctenocephalus felis* were present in fair numbers. In conducting the research the live rats were chloroformed and the fleas obtained by combing the rat. Three species were found—*Nosopsyllus* (*Ceratophyllus*) *fasciatus*, *Xenopsylla cheopis* and *Leptopsylla segnis* (*musculi*). The findings of *Xenopsylla cheopis* were almost entirely confined to a certain grain store. W F H

PISTONI (Ferruccio) Fauna murina in Eritrea e nello Scioa. Ricerche parassitologiche. [Murine Fauna in Eritrea and in Scioa.]—*Arch Ital Sci Med Colon e Parassit* 1938 July Vol 19 No 7 pp 388-394

A survey has been made by the author of the rats together with their ecto- and endoparasites in the seaport of Massana in Asmara a town in the highlands of Eritrea and in Addis Ababa. In Massana out of 200 rats captured 187 were *Mus rattus rattus* and 13 *Mus rattus*. No rats of the species *Mus norvegicus* (*decumanus*) were caught. In the

highlands of Eritrea and of Selom there was a slight preponderance of *Mus rattus* over *Mus rattus rattus* and *Mus musculus*. Ectoparasites in the plains of Eritrea were represented by *Xenopsylla cheopis* and *Nosopsyllus fasciatus* but the parasitic index was low during the hot weather whereas it was higher and more constant in the hills. The endoparasites specially noted in both hills and plains were *Giardia* and *Trypanosoma lewisi*.
W F H

ALI (P. Mohamed). A Rat-Flea Survey of Mattarahery (Goshin) (1937).—*Indian Vet Gaz* 1938 July Vol 73 No 7 pp 409-412

OTOMO (T.) KOGA (S.) & TANAKA (I.) Les rats et leurs puces dans les entrepôts douaniers de Kôbé. [The Rats and their Fleas in the Customs Depot of Kobe].—*Bull. Office Internat. d'Hyg. Publique* 1938, July Vol. 30 No. 7 pp 1435-1436.

It is to be expected that the species of rats found on board ship will differ significantly from those on shore. The storage depots of the Customs have an intermediate position in this respect, as the present incomplete investigation lasting from 1st to 25th October shows. A proportion of 70 marine to 30 shore rats was found. According to species there were in percentages, *Rattus rattus alexandrinus* 71.57 *Rattus norvegicus* 11.20 *Rattus rattus rattus* 9.90 and *Mus molossinus molossinus* 7.26. The fleas found on the rats were in the percentage proportions *Xenopsylla cheopis* 75.62, *Ceratophyllus fasciatus* 21.07 *Ceratophyllus anisus* 1.36 *Leptopsylla musculi* 0.56 and *Echidnophaga gallinacea* 1.36. The *cheopis* index in the depots was about 4.2.

W F H

GUTMARAKS (L. R.) Sobre a incidência de pulgas em ratos na cidade de Santos. [Fleas on Rats in Santos].—*Ann. Paulist. Med e Cirurg* 1938, Sept. Vol. 33 No 3 pp 283-289 With 3 graphs

A total of 2,088 rats and 3,906 fleas was examined in Santos on the coast of Brazil. The rat species *Epmys norvegicus* made up 80.36 per cent. of the total with flea index 1.73 the predominant flea, 46.67 per cent. was *Xenopsylla cheopis*.
W F H

RISTORCELLI (A.) Les rongeurs sensibles à la peste dans la région du Neftzoua. [Rodents Susceptible to Plague in the Region of Neftzoua].—*Arch. Inst. Pasteur de Tunis* 1938 Sept. Vol. 27 No. 3 pp. 296-303 With 1 map

The region of Neftzoua in Tunis is a strip of country stretching from beyond the salt lagoon of Shott el Djerid in the North to Ghadames in the South and having the Algerian frontier on the West. Rodents found in this territory are the dormouse *Psammomys* and merions, gerbils *Mus musculus* *Rattus alexandrinus* *jerboa* and *Ctenodactylus gundi*. Gerbils and *Psammomys* predominate. Although human plague has not been known since the French occupation it is said to have decimated the district a century ago. Epizootics are described by the natives and are said to be due to ticks of the genus *Hyalomma*. If epizootic plague did make its appearance it would probably spread rapidly.
W F H

MORGAN (M T) Mémoire publié par le Ministère Britannique de l'Hygiène sur la méthode à suivre pour l'examen des rats au point de vue du diagnostic de la peste. [Departmental Method of examining Rats for Plague]—*Bull Office Internat d'Hyg Publique* 1938. July Vol 30 No 7 pp 1437-1439

(1) Attach the dead rat to a board belly upwards (2) Reflect the skin from the jaw to pubis and search for cervical axillary and inguinal lymph nodes not forgetting that there are sex glands in front of the pubis which may normally contain numerous small bipolar bacilli. (3) Note the presence of subcutaneous haemorrhage or congestion (4) Dissect out every suspicious lymph node and section it. (5) Make films and examine microscopically if any sectioned surface suggests necrosis. (6) Open the abdomen and remove small pieces of tissue from liver and spleen after sterilizing the surface by cauterization (7) Fix films made from suspicious lymph nodes in the flame treat with absolute alcohol stain with carbol thionin under gentle heat and wash in tap water (8) Examine for bacilli with bipolar staining (9) Take portions of tissues such as nodes, liver spleen, etc., in any case which has shown bipolar bacilli for test culture and inoculation into a guinea pig (10) Sow the fragments of tissue without making into suspension directly on well dried ordinary nutrient agar plates. (11) Inoculate the guinea pig subcutaneously at a shaved spot on the abdomen to the left of the middle line (12) Send material such as the rat organs or culture which have proved suspicious of plague infection to the Ministry of Health Laboratories, London whose duty it is to confirm the suspicion (13) Take all precautions to have this material, in a carefully corked wide-mouthed bottle surrounded with sawdust, packed in a tin box (14) Send a telegram in advance to notify the Minister of Health. W F H

ROBIC (J) & MINEC Note sur un cas de peste bubonique compliqué de pyomyosite à bacille de Yersin (Case of Bubonic Plague complicated by Plague Abscesses in Muscles.)—*Bull Soc Path Exot* 1938. July 6 Vol. 31 No 7 pp. 679-682.

The patient was a young man of 21 years who developed plague and buboes in both inguinal regions. That on the left side opened spontaneously and discharged abundant pus. The iliac lymph nodes were secondarily affected and supplicated also. Death occurred suddenly 17 days after the appearance of the first bubo from haemorrhage due to ulceration into the femoral or iliac artery. There is nothing very extraordinary in this history. What was quite unusual, however was the development of intramuscular abscesses in both upper and lower extremities. Two of these were aspirated before they had opened and yielded in the one case a pure culture of *Past pestis* and in the other *Past pestis* along with *Staph albus*. A reference is made to the presence of this latter organism either in the category of a contaminant or as having a more causative rôle. The case may be described as one of plague pyomyositis. W F H

ANCHEZAR (Benjamin V) Estudio bacteriológico y anatomopatológico de la infección experimental con *Pasteurella pestis* (Cepa E.V. avirulenta de Girard.) [Experimental Study of Plague Strain E.V.]—*Rev Inst Bacteriológ* Buenos Aires 1938. Aug Vol. 8. No 2. pp 196-227 With 5 figs. on 3 plates [27 refs.]

A strain of plague was isolated by GIRARD in Madagascar which is not merely avirulent but can be used as living vaccine in man. The

present study has been directed to following out the effects of this living E.V. strain on the very susceptible guinea-pig. Conclusions arrived at are 1 The E.V. strain which was isolated from a patient with bubonic plague is identical in all respects with *Pest. pestis*. 2 The living E.V. strain is avirulent for the guinea-pig in small or medium doses whether administered subcutaneously intraperitoneally intratracheally or by the mouth. 3 In large doses (of 250,000 million organisms) it causes death in guinea-pigs and rats by toxic action. 4 Experimental infection has shown that E.V. bacteria (a) have selective effect on the lymph nodes and spleen, (b) are temporarily present in the blood and bone marrow and (c) persist for a considerable time at the site of inoculation. 5 The inoculation gives rise to localized inflammatory lesions, such as regional adenitis and peritonitis and temporarily to more general lesions of infective type. *W F H*

GIRARD (G) & ROBIC (J) Vaccination antipesteuse par germes vivants (virus vaccin E.V.) Trois années d'application à Madagascar [Plague Prophylaxis with E.V. Living Vaccines].—*Bull Acad Méd* 1938 July 5 102nd Year 3rd Ser Vol 120 No 26 pp. 54-60 With 1 chart.

Many communications by the authors have been noticed on this subject (this *Bulletin* 1934 Vol 31 p. 885 1935 Vol 32, p. 850 1936 Vol 33 pp. 366 877 1937 Vol 34 p. 408 1938 Vol 35 p. 209). The summary here given is A huge programme of plague prophylaxis by means of living avirulent E.V. vaccine has been carried out during the past three years and over 2,000,000 vaccinations have been performed. The killed vaccine which was originally used had given mediocre results. With living vaccine on the other hand an 80 per cent reduction of mortality is claimed. *W F H*

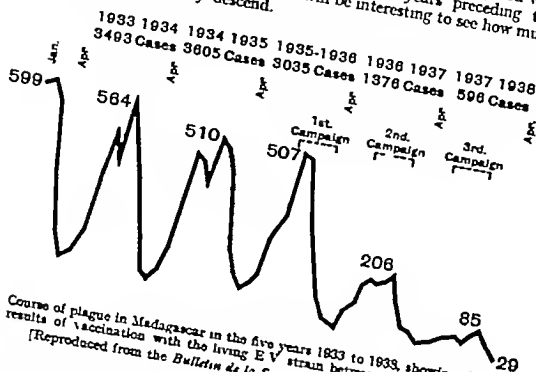
PASSA Prophylaxie de la peste à Madagascar [Prophylaxis of Plague in Madagascar].—*Bull. Office International d'Hyg. Publique* 1938 July Vol 30 No. 7 pp. 1440-1441 With 1 chart.

Plague has been present on the High Plateau since 1921. From the year 1935 large scale prophylactic inoculation of living plague vaccine has been carried out with the result that in the three years 1935 to 1937 there were performed 500,000 711,039 and 815,453 single dose vaccinations respectively and corresponding reported cases of plague were 3,493 2,007 and 918. This represents a notable reduction. *W F H*

ROBIC (J) Film cinématographique sur la vaccination antipesteuse à Madagascar [Cinematograph Film of Anti-plague Measures in Madagascar].—*Bull. Soc. Path. Exot* 1938 Oct. 12 Vol 31 No. 8 pp. 660-661 With 1 fig.

A film of plague work has been shown in country districts of Madagascar with the final projection on the screen of a graph to illustrate the results of vaccination with the living E.V. strain of plague bacillus. This graph is reproduced below and shows for the five years 1933 to 1938 the number of cases of plague to have been 3,493 3,605 3,035 1,376 and 596 respectively. The E.V. vaccine first introduced in November 1935 has in three separate campaigns of inoculation

made as is shown graphically a solid impression on the case incidence of plague. The final figure (596) for 1937-38 is to be compared with a mean annual incidence of plague for the years preceding the vaccination campaign of 3,500. It will be interesting to see how much lower the graph may descend.



Course of plague in Madagascar in the five years 1933 to 1938, showing the results of vaccination with the living E V strain between 1935 and 1937
[Reproduced from the *Bulletin de la Société de Pathologie Exotique*]

W F H

ROSIER (H J) Verlag betreffende de pestbestrijding op Java over het jaar 1936 [Anti-plague Measures in Java during 1936.]—*Vedst. Dienst d. Volksgezondheid in Nederl. Indië* 1938 Vol 27 Supple- ment. 84 pp With 13 graphs & 9 maps & sketch maps

MACCHIAVELLO (A.) & CONTRERAS (Manuel) Estudios sobre peste bubonica. IV Diez años de lucha anti pestosa, 1928-1937 [Bubonic Plague Ten Years of Anti-plague Measures 1928-1937]—*Rev. Chilena de Hig y Med Preventiva* 1938 Apr-June Vol. 1 No 4-6 pp 183-189 [10 refs]

MEYER (K F) Sylvatische Pest. [Sylvatic Plague]—*Schweiz. Med. Woch.* 1938 Aug 6 Vol. 68 No 32 pp 925-928.

The history of plague in San Francisco and California is one of ebb and flow but never of final disappearance. Here too the importance of sylvatic plague was discovered and the importance of persisting though sometimes latent infection among ground squirrels. Some twelve species of wild rodents have been incriminated in sylvatic plague species of the genera *Citellus*, *Marmota*, *Peromyscus*, *Neotoma*. It is depressing to read though probably true that no doubt remains that North America from now on will remain a permanent plague focus.

MEYER (K. F) Sylvatic Plague—*Amer. J. Public Health* 1938 Oct. Vol. 28, No 10 pp 1153-1164. With 1 fig
This article is a report on the subject of sylvatic plague by the chairman of the Sylvatic Plague Committee. Two human cases of

W F H

plague, contracted presumably from wild rodents, are described. In the one case the rodent was not identified although "fleas carrying plague bacilli were discovered in the region." The other case gave a history of having been bitten by a chipmunk (*Callospermophilus* (*Citellus*) *chrysodermus*) and it was reported that an epidemic disease had been prevalent among the rodents of the area. Some of the recommendations made as a result of the occurrence of human cases are the use of lymph node punctures for diagnosis in doubtful cases the use of antiplague serum rodent proofing of summer houses warning to residents "not to touch or play with chipmunks or other rodents" reporting of noteworthy rodent mortality prohibition of sale of chipmunks, golden mantled squirrels or other rodents until after two weeks quarantine.

Special consideration is given to latent rodent plague and to the method of its detection by mass inoculations of fleas or fleas by the pool method. Reference is made also to the skin tests and serological procedures used by Russian investigators to detect invisible plague in rodents.

Under the heading scientific investigations some important results are listed —

"(a) The rodent population in a plague area in the California mountains varies from 27 to 117 individuals per acre. Trapping small areas is followed within two months by recovery to a considerable fraction of the original numbers. (b) Rodent control over a narrow belt is soon followed by re-invasion. (c) Experimental studies have shown that methylbromide administered at the rate of 10 cc. per burrow opening, is very efficient in controlling both burrow rodents and their fleas. The fumigant of course must be used with the customary care accorded to all highly toxic gases."

IV F H

DE LA BARRERA (JOSE MARIA) & CORICA (PABLO). Peste rural en Mendoza. (Rural Plague in Mendoza).—*Polis Biol. Buenos Aires*. 1933 Feb-Mar. Nos. 83-84 p. 353

STEWART (M. A.) & MACKIE (D. B.). The Control of Sylvatic Plague Vectors.—*Amer J Hyg*. 1933. Nov. Vol. 28. No. 3. pp. 469-480 [14 refs.]

The flea is not only a vector of plague but may be a reservoir also so that measures for the eradication of sylvatic plague must aim at killing off not only the rodents concerned but their fleas as well. Much of the work already done on this subject has been directed to the burrowing rodents and to the disinfection of their burrows. In methyl bromide apparently a substance has been found which will kill both the rodent and its fleas whereas hydrocyanic acid has not been so efficient in this respect. Experiments were undertaken to test a number of fumigants in a specially constructed apparatus ethylene dichloride ethylene oxide propylene oxide dicotynal malate sulphur dioxide methyl bromide hydrocyanic acid gas carbon monoxide 1,4-diethylene oxide di-chlorethyl ether carbon disulphide and chloropicrin. Because of the deficiencies of hydrocyanic acid gas and since methyl bromide was next highest in efficiency in the laboratory tests, all further investigations were confined to the latter. The fleas used were taken from the Douglas ground squirrel

(*Citellus beecheyi*) and belonged to the species *Diamanus montanus* and *Hoplopsyllus anomalus*. In the field about 10 cc. of liquid methyl bromide per burrow opening is used. It is well to recognize however that methyl bromide is colourless and odourless and has poisonous action. Care must be taken then by the trained operators in using the fumigant lest they come accidentally in contact with the chemical and receive burns or breathe its fumes which are to some extent toxic. The authors have experimented with gram and tests show that food materials are not rendered toxic by the fumigant. It is probable therefore that methyl bromide could be used satisfactorily for the fumigation of cargoes.

W F H

HELMINTHIASIS.

PRELIS OF ABSTRACTS IN THIS SECTION

KAUFMAN (p. 319) shows that *Ascaris* is found in 3 per cent. of corpses in Bresden. WINFIELD and CHIN (p. 319) emphasize the importance of the pollution of the household environment in both urban and rural districts in China, in the maintenance of *Ascaris* infestation. FOSTER (p. 320) compares the infestation by children in London with a recent comparison by children in the United States that the improvement in worm infestation shown in a recent comparison is due to mass treatments.

BARRETO & ARIDO (p. 320) found that the improvement in worm infestation shown in a recent comparison is due to mass treatments. SANG (p. 321) shows that a watery extract of *Ascaris* contains a protease which inhibits the action of trypsin. LONGLIN (p. 321) describes an ascariasis in the oesophagus removed through the mouth. MULLAN and NERPOLO (p. 321) a case of suffocation due to these worms in the trachea, ZABAWI (p. 321) a case of intestinal obstruction and RAJAHAM (p. 321) one of multiple liver abscesses due to *Ascaris*. KÖ (p. 322) saw a girl of 2½ from whose umbilicus 16 of these worms escaped.

MAPLESTONE and MUKERJI (p. 322) discuss the treatment of ascariasis by oil of chenopodium combined with santonin. Chenopodium in doses graded in the usual way according to age is less successful for children than for adults. DOUBROW (p. 322) describes hookworm disease in the miners in the Loire. Most show no symptoms but some are gravely ill. Treatment is by thymol. DÍAZ (p. 323) found helminth infestation in 41 per cent. of children in Resistencia (Chaco). Hookworm was the most frequent. PESSOA and PASCALE (p. 323) working on estates in São Paulo found 80.5 per cent. infected by *Necator*. Heavier infection was found in those whose dwellings had no latrines than in those possessing them. Treatment was by tetrachlorethylene and other drugs.

SCOTT (p. 324) shows that overt blood loss leads rapidly to iron deficiency. Available iron stores are equivalent to about half the haemoglobin and may repair anaemia from blood loss quickly but this can only happen once and thereafter even small haemorrhages may produce anaemia rapidly unless the iron store is replaced. This explains why anaemia and amount of hookworm infection are often not parallel. The commonest cause of overt blood loss is probably hookworm disease.

CASTILLO ODESA (p. 325) shows the importance of treating children for ankylostomiasis in the schools in the Argentine. AKETAGAWA (p. 325) concludes that canine hookworm larvae, when swallowed, penetrate the wall of the alimentary canal. V. BRAND and OTTO (p. 325) found a low glycogen content in *A. caninum* and that infection had no effect on the carbohydrate metabolism of the host.

KHALIL (p. 326) believes that the periodicity of the microfilariae of *W. bancrofti* in the blood depends upon the site of the adults in the human body and that day and night postures are factors in controlling

lymph flow. An explanation of the common occurrence of *W. bancrofti* in the lymphatics of the spermatic cord depending on the warmth of the tissues, is given.

GALLIARD (p 328) in two post-mortems found no evidence to support the view that autoinfection by *Strongyloides* is common.

RAMOS E SILVA (p 328) gives a local treatment of chenopodium wintergreen and gomenol for larva migrans.

JONES (p 328) gives instructions for the use of the cellophane NIH swab in the diagnosis of *Enterobius* infection but REARDON (p 328) calls attention to artifacts resembling the ova which frequently occur in the cellophane. She also (p 329) gives numbers of eggs counted in the gravid females. MARSHALL and WOOD (p 329) consider that *Enterobius* caused an ischio-anal abscess in a boy. WRIGHT and BRADY (p 329) found gentian violet efficient in treatment of thread worm infection. C W

KAUFMANN (W) Ueber Wurmerkrankungen [On Helminth Diseases].—*Med Klin* 1938 June 17 Vol. 34 No 24 (1747) pp 810-811

As to *Ascaris* it is noted that in Dresden it is found in 3 per cent of corpses at most. The work of MAY at Lahr in Baden showed about a quarter of the people there infected [this *Bulletin* 1938 Vol. 35 p 668]. The difference is considered. In the treatment of thread-worms in which the fingers are emphasized as conveyors of eggs from anus to mouth an ointment of percaene with menthol is advised as well as the anointing of the anus before a stool with zinc ointment and the taking of slops as food. Evidence of their value is not offered.

Clayton Lane

WINFIELD (Gerard F) & CHIN (Ta-hsiung) Studies on the Control of Faecal-borne Diseases in North China. VI. The Epidemiology of *Ascaris lumbricoides* in an Urban Population.—*Chinese Med J* 1938 Sept Vol. 54 No 3 pp 233-254 With 1 graph

The environmental studies indicated that the pollution of the household environment is probably the most significant factor in maintaining the *ascaris* infestation of the city just as it is in the country. It seems to me that the part children play in polluting the environment cannot receive too much emphasis.

The stools were from 2 751 civilians in and around Tsinan and from 393 soldiers of the Shantung provincial forces. The following figures show in order the class of person examined, their numbers and the percentage of infection discovered by Stoll's egg counting method for *Ascaris* hookworm and *Trichuris*. Children in 6 primary schools 895 percentages 43.9 11 3.2 students in the Provincial School of Dramatics aged 7 to 30 total 133 percentages 44.4 12 7 3 middle schools students mostly aged 10 to 19 total 503 percentages 22 7 3.6 college students total 173 percentages 15.6 1 7 10.9 nurses total 47 percentages 38 3 0 10.6 hospital patients total 416 percentages 31 7 8.4 5 5 in city families total 584 percentages 39 7 1.9 2 1 soldiers 393 percentages 8 1 26 7 4 2.

For studies of environment 37 families were selected in Tsinan 15 lightly and 22 heavily infected with total members of 77 and 116 the infection rates for *Ascaris* being 14.3 and 68.4. Of soil samples

taken for examinations the percentages of those positive for *Ascaris* eggs were—in courtyards 37.5 and 75 in rooms 33.5 and 57.1 in streets 83.5 and 40. Most latrines had as receptacle a small brick walled pit cleaned every 5 or 6 days. "one family had a septic tank into which they flush their sewage by means of a bucket of water poured into the latrine and this family was one of the most heavily infected. In no latrine was the pit covered, flies were seen in all but 4 and dogs and chickens had access to all but 6. Of the 22 heavily infected families 12 had children who defaecated in the courtyard from the 15 lightly infected families no such report came. C. L.

DEMPSTER (G. O.) Intestinal Parasites in Western Samoa.—*New Zealand Med. J.* 1933, Aug. Vol. 37 No. 200 pp. 214-218. With 1 fig.

The results are given of a faecal survey of racially pure Samoans in Western Samoa by a slightly modified Willis technique of salt flotation."

The undescribed modification showed no infection by hookworm or *Trichuris* and almost none by *Ascaris* in babies under 1 year old. For these infections there was a sharp rise during childhood reaching 50 to 60 40 to 50 and 18 per cent respectively in adult life.

"Attention is drawn to a discrepancy between the rates of *ascaris* and *trichuris* infestations, which theoretically should be similar.

An improvement on the previous state is shown. This may be partly due to the less accurate technique than that of Hopkins, but for all practical purposes it is accurate enough. An individual infestation with one hookworm is of academic interest only.

Improvement must be due to mass treatments, as sanitary conditions in Samoa are static and have been for some centuries. Any improvement must be due to mass treatment, which therefore appears to be justified as regards expense and the only method at present at our disposal for the control of this disease.

All authorities are agreed that the Willis technique is more accurate [than D.C.F.] in demonstrating ova of *ascaris* and *trichuris*." (As a worker not as an authority LANE found (this *Bulletin* 1926, Vol. 23 p. 281) that using the same quantity of centrifugal precipitate from the same faecal suspension, and floating with a salt solution of s.g. 1.200 the number of *Ascaris* eggs collected by one spin of D.C.F. averaged 1 415 (1 156 to 1 740) by Willis technique as used by Lambert 230 (32 to 596) by Willis technique when the eggs lost during Lambert's reversal of the slide were caught 333 (36 to 946) For *Trichuris* eggs in the same conditions the average for D.C.F. was 15 (12 to 18) for Lambert a modification of Willis 3.5 (0 to 10) and for the total Willis collection 9.8 (0 to 23)] C. L.

BASQUEYO (José G.) & ANIDO (Vicente) Conteo de huevos de helmintos. [Counting Helminth Eggs].—*Rev. Med. Trop. y Parasit. Habana*. 1938 Mar-Apr. Vol. 4 No. 2 pp. 85-87.

The technique consists of suspending faeces in 1 per cent hydrochloric acid by the aid of glass beads and shaking putting the suspension through a sieve and counting an amount of it representing 0.0025 gmt. of faeces. In an example given four such preparations showed *Trichuris* eggs varying between 3 and 6 and *Necator* eggs between 0 and

5 [The accuracy of the technique is in no way tested and apart from the variation in eggs reported in the paper itself, it will be remembered that the mere straining of a suspension removes eggs] C L

SANG (James Henderson) The Antiproteolytic Enzyme of *Ascaris lumbricoides* var *suus*.—*Parasitology* 1938 June Vol. 30 No 2. pp 141-155 With 7 figs. [30 refs.]

A point for medical men is that *in vitro* a watery extract of *Ascaris* contains a readily diffusible protease namely ascarase which combines with trypsin and inhibits its action an effect which presumably explains the inability to digest protein which may be present in this infection C L

VOEGTLIN (Walter L.) Some Novel Manifestations of Ascariidiasis.—*Northwest Med* 1938 June. Vol 37 No 6 pp 182-183

The unusual symptom was as of something crawling up through the chest to the level of the larynx and being stopped by rapid swallowing. Finally on reaching to the back of her throat this woman of 26 pulled out a 7½ inch *Ascaris*. Caprocol brought away five worms and the symptoms persisting hexylresorcinol two more after which they ceased Excessive hunger had also been present C L

MILLAN (Justo M) & NESTOLO (Juan F V) Obstrucción traqueal por áscaris [Tracheal Obstruction by *Ascaris*.]—*Prensa Méd Argentina* 1938. June 1 Vol 25 No 22 pp 1070-1072. [28 refs.]

A child of 11 months died of suffocation the result of several adult *Ascarids* in the trachea. There were also many in the stomach and intestine. C L

ZAHAWI (Shawkat) Intestinal Obstruction and Atrophic Lesion of the Appendix caused by *Ascaris*.—*Jl Trop Med & Hyg* 1938. Oct. 1 Vol. 41 No 19 pp 316-318. With 2 figs.

Some two pounds weight of *Ascaris* caused the death by intestinal obstruction of a boy of 10

Though the obstructing worms lay in the small intestine the appendix was enlarged to a length of 12 cm and a breadth of 3.9 cm. [from the photograph figured this latter was presumably measured with the appendix flattened] and contained four *Ascarids*, its wall being markedly thinned with the mucosa absent C L

RAJAHRAM (S G) A Case of Abscess of the Liver due to *Ascaris lumbricoides*.—*Jl Malaya Branch Brit. Med Assoc* 1938. Sept Vol. 2. No 2. p 103.

A girl of 6 died with five *Ascaris*-containing abscesses in her liver. One had opened in the epigastric region leaving a sinus from which three ascarids had escaped while she was under observation in hospital at which time she had emaciation fever and an enlarged liver. At autopsy there were still two worms in the cavity into which the sinus ran. The dilated and inflamed bile ducts showed other worms and there was one in the duodenum though santonin during life had not led to the passage of worms. C L

h.5 (Tōm) Ein Fall von Ausschlüpfung der Ascariden durch die Mitte der Nabelgrube hindurch. [Escape of Ascarids from the Navel.]—*Tarzan Igakkei Zasshi* (*Jl Med. Assoc. Formosa*) 1938. Apr. Vol. 37 No. 4 (397) [In Japanese pp. 758-762. With 4 figs. on 1 plate. German summary p. 763]

A peasant girl, aged 2½, complained of abdominal pain for some two months. After the appearance at the umbilicus of a serous discharge ascarids began to worm their way out of it to the number of 16 during 35 days. She had no fever apart from malaria, and no colic. C. L.

MAPLESTONE (P. A.) & MUKERJI (A. K.) The Treatment of Ascariasis. —*Indian Med. Gaz.* 1938. June. Vol. 73 No. 6. pp. 326-328.

Treatments were by oil of chenopodium of B.P. standard and combined with santonin in varying doses.

The standard adult dose of oil of chenopodium was ℥ xv and in general the efficiency of treatment as judged by an unstated technique lessened as its dose was diminished below 12 to 10 minims, and when the two drugs were given together its dose when reduced had a far greater effect in lessening the success of the treatment than had santonin. The lessening of the dose of oil of chenopodium for age that is size of a patient as is the usual custom for drugs, is not successful, and it is pointed out on the one hand that the worms which are to be poisoned are of the same size whatever the size of the host, but that, the child's intestine being smaller the reduced dose should give a proportionate concentration of the poisonous drug round the worm. A second suggested explanation is that as most intestinal helminths more readily infect young than old animals, it may be a matter of power to maintain position. [A third explanation is that after absorbing ascaridole the host's body produces from it as it seems to do from santonin and thymol, the real anthelmintic substance, and that in the child these activities are less marked than in the adult. That the host's body does absorb and change ascaridole is shown by the report that after the administration of oil of chenopodium it disappears from the intestinal contents and that in the urine there is present glycuronic acid and a smell of thyme (CAIUS & BHASKAR *Indian Jl Med Res.* 1920 Vol. 7 pp. 570-609)] C. L.

DOUBROW (S.) L'ankylostomose en pathologie du travail [Ankylostomiasis in Industrial Pathology]—*Arch. Maladies Professionnelles* Paris 1938 Sept.-Oct. Vol. 1 No. 4 pp. 298-305 With 2 figs.

In France ankylostomiasis is a disease of underground workers in Algeria and elsewhere in the French Colonial Empire it has no relation to industry. The infection cannot then be listed internationally as an industrial disease.

The paper deals essentially with French miners in the Loire and reports that of some 7 000 of them examined by the [uncontrolled] modification of Telemann's diagnostic method [this *Bulletin* 1932, Vol. 29 p. 756, and 1933 Vol. 30 p. 267] 1,236 infections were discovered. Of these 1,032 (83 per cent.) had no symptoms 204 were anaemic, 31 of them gravely so the other 173 being unfit for full work. Cure of the anaemias closely follows expulsion of the worms it however not being stated what amount of haemoglobin the author

considers to be normal. Treatment is by freshly powdered thymol in cachets three doses of 1 gram each at hourly intervals on each of three consecutive days or 9 grams (135 grains) in all with a purge on the 4th day. Treatment is given in hospital and all stools after admission to hospital are kept each man's in his own bucket and sieved on the fifth day. Surface latrines permit of the miner easing himself before going underground. Apparently there are no underground latrines. C L.

DIAZ (Benito) El índice anquilostomiasico en la ciudad de Resistencia (Chaco) [The Hookworm Index in the City of Resistencia (Chaco)] —*Bol Sanitario* Buenos Aires 1938 Apr Vol 2 No 4 pp 279-310 With 8 graphs & 3 charts

Faecal examinations were made on 1 102 children in nine schools in the city of Resistencia. Percentages of detected infections were as follows: any helminth 41.1 hookworms 29.3 (11.1 to 43.8) *H. nana* 11.7 *Trichuris* 7.9 *Enterobius* 1.8 *Ascaris* 0.7 *T. saginata* 0.4

Faecal examinations for presence of infection were by the Willis technique for egg counting by that of Stoll using 0.075 cc. With the intensity of infection present the Stoll technique missed over 20 per cent. of them. On the method of calculation used 30 per cent. of the children harboured ten and over 70 per cent. less than a hundred parasites. There was no correlation between the estimated weight of infection and the anaemia induced. The clay subsoil of the Chaco favours hookworm infection. C L.

PESSOA (S. B.) & PASCALE (Humberto) Pesquisas sobre a ancylostomose em São Paulo III Intensidade da ancylostomose em algumas fazendas de café no município de Ribeirão Preto [Inquiries on Necator Infection in São Paulo III. Its Intensity in Certain Coffee Estates in the Ribeirão District.]—Reprinted from *Ann Facul Med Univ São Paulo* 1937 Vol. 13 pp 167-180 With 3 graphs. English summary

— & — IV Análise da infestação pelo Necator em uma fazenda de café e canna no município de Sertãozinho [IV Analysis of Necator Infection in a Cane and Coffee Plantation in Sertãozinho District.]—*Ibid* pp 181-210 With 4 graphs. English summary

— & — V Observações sobre o tratamento da ancylostomose pelo tetrachlorethileno baseadas em contagens de ovos antes e depois da administração do remédio [V Treatment of Necator Infection by Tetrachlorethylene based on Pre-Treatment and Post-Treatment Egg Counts.]—Reprinted from *Folia Clin et Biol S Paulo* 1937 Vol 9 No 6 pp 165-169

III In 626 persons from whom 0.005 gm. of faeces were examined by the Stoll-Hausheer caustic soda solution method, this technique displayed necator infection in 80.5 per cent. The greatest weight of infection, judging by egg counts was between 15 and 19 years the diminution after 20 being held to be evidence of acquired age resistance. This method of examination disclosed 81.4 per cent. of men infected with an average of 2,276 eggs per gm. the figures for women being 79.4 and 2,736

The few figures available suggest that those who do and those who do not work in the plantations are equally infected.

IV In Fazenda Vassoural the percentage found infected was 62, with an average of 1,684 eggs per gm. The inhabitants were divided into two groups those whose dwellings had no latrines of any kind and those in which latrines of a simple and absorbent type [presumably pit latrines] were provided. In the former the average eggs per gm. were for men and women 2,960 and 2,326 and in the latter 1,551 and 890. As to race in white men the percentage of infection detected was 84.1 of 354 examined and in women 60.8 of 364 the corresponding figures for negroes were 84.2 of 56 and 70.4 of 81. In 61 white men in whom no eggs were detected by the Stoll-Hansaer technique the percentage of haemoglobin was 75.3 in 125 in whom eggs were less than 5,000 to the gram it was 73.3 and in 25 in whom eggs were 5,000 or over 67.4 the corresponding figures for negroes were in 16 75.7 in 12, 73.6 and in 1 53 per cent. there was then no direct relationship between detected egg numbers and the percentage of haemoglobin.

V To the Stoll-Hansaer diagnostic technique there were percentage decreases in necator egg numbers (after tetrachlorethylene given in an adult dose of 3 cc.) varying from 46 to 49 after one treatment and from 78 to 84 after two. It is well to note that after 2 cc. of this drug the number of *Ascaris* eggs was increased by 9 per cent. Figures are given for other treatments.

C. L.

Scorr (R. Bodley) The Iron-Deficiency Anaemias.—*Lancet*, 1939, Sept. 3 pp 549-552.

Under "Overt blood loss" come these words: "In a world-wide census the commonest cause would probably be blood loss due to infestation by the hookworm."

[There runs through hookworm literature surprise, expressed or implied, that anaemia and the weight of hookworm infection do not run parallel. The following sentences from this paper put the matter with admirable clarity for it is not the number of hookworms that determine the onset and degree of hookworm anaemia, but the host's iron reserve.]

"The total amount of iron in a healthy adult is between three and four grammes and it exists in three main forms. First, the iron of the circulating haemoglobin which has an average total of 2.5 g. secondly iron stored in the liver bone-marrow and spleen which is available for conversion into haemoglobin should need arise. Clinical experience shows that a healthy man may reduce his haemoglobin to 60 per cent. and subsequently repair the anaemia without administration of iron so it may be taken that the available iron stores are equivalent to about half the haemoglobin-iron or 1.15 g. Thirdly a small amount exists in the tissues in an unavailable form."

"Overt blood loss will rapidly lead to a state of iron deficiency. It is recognised that an adult may lose about half his total blood volume and yet mend the consequent anaemia completely without the administration of iron but this may only happen once, for the repair of the anaemia will have exhausted the whole of the available iron store in the body and thereafter every milligramme of haemoglobin lost is haemoglobin which cannot be replaced until the patient be given more iron. Once the iron reserve has been depleted in this way anaemia will develop rapidly from

what may seem trivial loss of blood and will persist after the haemorrhage has stopped because the raw material for manufacture of haemoglobin is lacking

C L

CASILLLO ODENA (Isidro) Papel que desempeña la escuela en la profilaxis de la anquilostomiasis en la República Argentina [Schools in the Prevention of Ankylostomiasis in the Argentine]—*Bol Sanitario* Buenos Aires 1938. Feb Vol. 2. No 2. pp 136-144 With 2 graphs

The fourth South American Conference on Hygiene Microbiology and Pathological Anatomy held in 1928 urged the importance in any antihookworm campaign of treating children while attending school.

In 1935 1936 and 1937 treatment was given to children in 269 296 and 356 schools respectively. In all 30 708 treatments of which 27 073 were first ones. Of 13 622 children who went barefoot the percentage of detected infection (the technique seems nowhere to be stated) was 49.6 of 12,254 whose homes were without latrines it was 59.4. Tallquist and faecal examinations were made in about 10 per cent of those reported on. The toxicity of anthelmintics and the value of iron are noted

C L

AKETAGAWA (Hiroshi) Some Experimental Contributions on Oral and Cutaneous Infection of Hookworms.—*Japanese Jl Experim Med* 1938. June 20 Vol. 16 No 2 pp 85-107 With 5 charts & 6 figs. on 1 plate [11 refs.]

It is concluded that infective canine hookworm larvae when swallowed penetrate the wall of the alimentary canal and do not remain in its lumen.

A casual reference found in the paper shows that the author was dealing with the infective larvae of *Ancylostoma caninum*. From 72 to 96 hours after an infective feed there were collected from the bodies of pups about half the number of larvae which the feed had contained but if examination were delayed for 10 days 98 per cent. of these larvae were accounted for. In adolescent dogs the position was reversed—40 per cent being collected at the earlier and 32 at the later time. In old dogs this change was exaggerated, 24 per cent after 72 hours and 3.7 later. In a pregnant bitch the young were infected nearly all larvae being in their lungs, the quantity being described as up to nearly 30 per cent. of the number of larvae found in the mother's intestine.

C L

V BRAND (Th) & OTTO (G F) Some Aspects of the Carbohydrate Metabolism of the Hookworm, *Ancylostoma caninum* and its Host.—*Amer Jl Hyg* 1938 May Vol 27 No 3 pp 683-699 [18 refs.]

The total glycogen found in the dog hookworm (*A. caninum*) during these studies was much less than that so far reported for other intestinal helminths. Furthermore the total glycogen content of the worms was unchanged by short periods of starvation or alimentary hyperglycemia of the host. These facts may be related to the extraordinary blood-sucking habits of these worms which conceivably permits an oxidative type of metabolism and further insures a more or less continuous food supply

without the necessity of storing nutrient material. The severe but sub-lethal hookworm infections of a month's duration had no apparent effect upon the carbohydrate metabolism of the host. C. L.

- i. KHALIL (M.) The Site of the Adult Filaria in the Human Body is the Determining Factor in the Microfilaria being Periodic or Non-Periodic even in the Same Species.—*Jl Egyptian Med Assoc* 1938. Aug Vol. 21 No. 8. pp 502-505
- ii. — Microfilariae disappear into the Lymphatics when absent in the Peripheral Blood.—*Ibid* Sept No. 9 pp. 585-596.
- iii. — Thermotropism in Filariasis the Basis of the Clinical and Pathological Manifestations and the Rational Methods of Treatment.—*Ibid* pp 597-602

i. The title shows the scope of the paper. It refers to *Wuchereria bancrofti*

In the South Pacific Islands the intermediate host is *Aedes* a day biter mostly of the upper extremities, the adults grow up in the corresponding lymph vessels, their microfilariae pour directly into the veins of the neck or the terminal portion of the thoracic duct and they show no periodicity in the blood. Elsewhere the intermediate host is *Culex* which bites the lower limbs, especially in the evening before bedtime the adults grow up in the corresponding lymphatics and their young pass into the thoracic duct. The author adds that the adult *Wuchereria bancrofti* generally inhabits the lower parts of the body in most countries but in the South Pacific Islands a third to three-quarters of the worms inhabit the upper extremities. This is borne out by the fact that in Fiji Manson Bahr extracted adult worms from six cases, of whom three had worms in the upper limb. A second factor in causing periodicity is the lymph flow—in this way. In the daytime man's position is mainly upright and gravity keeps in the lower part of the thoracic duct and in its tributaries the microfilariae from the lower limbs when he lies down at night this attitude coupled with the maximum flow of chyle which it is said takes place 12 to 13 hours after a meal, is held to bring them into the blood about midnight.

[This note seems hasty for 17 per cent of it has been rewritten as corrigendum. Doubtless in the more extensive paper promised controls will be published and the results of infections of the male genitalia considered, for in both types of infection the lymphatics from these open into the thoracic duct. The statement regarding Bahr's work (1912) (*Jl London School Trop Med* 1911-12, Vol. 1 Supp. No. 1) is incomplete and refers to his Appendix V only for his Appendix XXIV shows that he found dead or living adult worms in all of six enlarged epitrochlear glands and in ten of eleven enlarged groin glands it being said of the eleventh the gland had been preserved in formalin thus making dissection a difficult task. In these non-periodic cases, then, the habitats of adult worms showed no perceptible discrimination in favour of the arm. Buxton's work (1928) [this *Bulletin* 1929 Vol. 23 p. 436] in the South Pacific is apposite for it covered both types of infection symptoms referable to worm infections of the male genitalia were noted in 40 per cent. of 1103 persons examined in Samoa where infection is non-periodic and in 30 per cent. of 318 persons in the New Hebrides, where it is periodic (Table 23). As to enlarged lymph nodes, to whose relationship with

the presence of worms BARR a quoted work testifies BUXTON in the cited table reported for the non periodic Samoan infection enlarged inguinal nodes in 45.8 per cent and enlarged epitrochlear nodes in 47.6 per cent while the corresponding figures for the periodic New Hebrides infection were 26.1 and 17.3 The locality of enlarged and presumably infected nodes had then no obvious relationship to the type of infection.]

ii Such a migration from the capillaries into the lymphatics was proved by experiment in [the sheathless] *Microfilaria immitis* of dog (Augustine and Drinker 1935)

This paper corrects two statements made in the earlier papers of his series. The first is a further addition to the long corrigendum in (i) as to the flow of chyle after food

In consulting the original paper of Munk and Rosenstein I found that this figure refers to the flow in 12 hours after food

It was mentioned in the last paragraph in the article referred to that all microfilariae in man live for a few hours while it is meant "a few days" [The original corrigendum had altered this to "for a limited time."] Then there is the *ex cathedra* statement regarding migration from blood capillaries into the lymphatics

In these repeated journeys through the lymphatic system the microfilariae pass into the blood circulation at a time determined by the lymph flow and posture in man. On the whole this tends to accoustuate nocturnal periodicity as the thoracic duct drains the major part of the body

iii. A series of statements held to support the hypothesis found in the title

ROSSI reports that from excised tissue containing adult *Wuchereria* the worms come out into warm saline if the lymphatics are patent. The spermatic cord region is the warmest in the body its lymphatics are the first in which valves lose their functions so there is direct communication between them and the pelvic and abdominal lymphatics and the worms migrate back and forth between them and the genitalia while most patients suffer no symptoms. But if too many worms get into and partly block a vessel it dilates into a lymphatic cyst this bursts or leaks internally and causes filarial lymphangitis and is the basis of the allergic filarial skin reaction. This explains all the known facts of Filariasis namely the common occurrence of *W. bancrofti* in the lymphatics of the spermatic cord and epididymis an absolute relief from periodic lymphangitis and elephantoid fever by removal to a cold climate the periodicity of the lymphangitic attacks seeing that the hole in the lymphatic closes and the cycle is repeated again at practically equal intervals and the attacks have a severity proportionate to the amount of fluid which escapes. A cold application chases the worms away if the passage for escape is clear if not it depresses their fecundity

Filarial lymphangitis, elephantoid fever Calabar swellings, the various skin manifestations in *Oncocerciasis* and *A. persians* infection are different grades of the same phenomenon. Bacteria may come in as a secondary infection or they may precipitate an attack by providing a focus of a high temperature attracting the adult filariae to it. The reported value of vaccine therapy is understood not as due to a specific *Streptococcus* but any kind of vaccine will have a similar effect. Adrenaline will be useful.

[The promised definitive report will presumably aim at justifying these *ex cathedra* statements]

C. L.

GALLIARD (Henri) L'auto-infestation au cours de la strongyloïdose humaine. [Autoinfestation by Strongyloides in Man.]—C. R. Soc Biol. 1938. Vol. 128. No. 20 pp 572-574

The conclusion that autoinfestation by Strongyloides is common is a hasty one and the statement that any delay of over a few hours during passage through the intestine implies formation of infective larvae is contrary to fact.

Three fatal cases of infection are noted. Of one it is merely said that filariform larvae were present in large numbers in fresh stools so that if they had been present in the intestine, they could have pierced the wall. In a second, who was in a state of extreme cachexia earlier at autopsy the interval between which and death is unstated, there were females and eggs in the lumen of the glandular crypts of the mucosa with no sign of penetration in numerous ulcers, and a very few degenerate filariform larvae. In a third there were no Strongyloides larvae but many rhabditiform ones on the surface of epithelium and of an ulcer but these seemed to have no tendency to penetrate. Cachexia and approaching death will favour formation of filariform larvae.

RAMOS E SILVA (J.) Sobre o tratamento da larva migrans. [The Treatment of Larva Migrans.]—Hospital 1938. Sept. Vol. 14 No 3 pp 465-468. With 1 fig

For creeping eruption the local treatment advised is an anthelmintic dressing consisting of oil of chenopodium 50 drops, essence of winter green 5 grams, gomenol 10 per cent. [? in olive oil] 50 grams. It soothes the irritation, quiets secondary inflammation and immobilizes the larva. The objection to freezing is that the larva may be beyond the viable tunnel. The other treatments and the kind of larva which may cause the lesion are noted.

GALLIARD (Henri) A propos de Rhabdits hominis Kobayashi 1914 — Rev Méd Française d'Extrême-Orient 1938. Apr Vol 17 No 4 pp 381-383

JONES (Myrna) The Diagnosis of Pinworm Infestation.—Rev Med Trop y Parasit Habana. 1938 May-June. Vol 4 No 3 pp 147-149

The Cellophane NIH swab [see HALL, this Bulletin 1937 Vol 34 p 878] is described and considered by a member of the U.S. Public Health Service. The following are clear instructions for its use — The cellophane covered tip of the glass rod is used much as a cotton swab might be used, with outward strokes along the anal folds and about the anus. The folded edges of the cellophane pick up sticky debris and eggs, or even worms when present. The swab is not inserted into the rectum. A considerable surface should be covered since the worms may migrate some distance before eggs are deposited. The cellophane may be removed from the swab and examined microscopically immediately after use or several days later with equally good results.

REARDON (Lucy) Studies on Oxyurias. X. Artifacts in "Cellophane simulating Pinworm Ova."—Am J Trop Med 1938. July Vol. 18. No. 4 pp 427-431 With 2 plates.

Artifacts which simulate ova of Enterobius are frequently found in the Cellophane of the NIH swab described by Hall (1937) [see this Bulletin

1937 Vol 34 p 878) used in diagnosis of pinworm infection. Attention is called to these artifacts in order to avoid possible confusion of them with pinworm ova. These artifacts are not superficial but are imbedded in the cellulose film and cannot be dislodged by surface scratching. They consist of a definite hyaline outline usually ovoid sometimes rounded enveloping a dark, amorphous mass, the whole structure markedly similar to a pinworm egg. The hyaline outline which appears to be composed of several layers, resembles the transparent shell layers of the egg of *Enterobius*. The central mass is irregular brownish or greenish with usually a clear space between it and the hyaline outline. Size variation is great but usually falls within the range of the pinworm egg so that size and appearance constitute a potential source of error in diagnosis of oxyuriasis.

C L

REARDON (Lucy) Studies on Oxyuriasis. XVI. The Number of Eggs produced by the Pinworm, *Enterobius vermicularis* and its Bearing on Infection.—*Public Health Rep* 1938 June 17 Vol 53 No 24 pp 978-984 With 2 figs. [14 refs.]

Counts made by rather precise techniques, of the eggs present in 20 gravid females of *Enterobius vermicularis* show from 4,672 to 16,888 eggs per worm. The arithmetical mean is 11,105 and the mean of the extremes is 10,780. These figures in connection with studies on the recovery of pinworm eggs from households, afford some explanation of the familial nature of oxyuriasis, and the status of pinworms as the most common of all the pathogenic worm parasites of man.

C L

MARSHALL (George R.) & WOOD (Q. L.) Ischioanal Abscess caused by *Oxyuris vermicularis*.—*Northwest Med* 1938 June Vol. 37 No 6 pp 180-182. With 2 figs. [18 refs.]

A boy kicked in the anal region developed a right ischioanal abscess which burst externally closed had to be reopened and which it was later discovered, was also in communication with the rectum. On reopening it was found to contain many threadworms and their ova [That the threadworms may well have got into the abscess through the opening (at first undetected) by which it burst into the rectum and were not the cause of the abscess is not considered.]

C L

WRIGHT (Willard H.) & BRADY (Frederic J.) The Treatment of Oxyuriasis.—*Rev Med Trop y Parasit* Habana, 1938 May-June. Vol. 4 No 3 pp 151-153

As controlled by the NIH swab gentian violet is apparently highly efficient in treating threadworms and it has many advantages.

Of 163 patients completely treated over 90 per cent. have become negative. The course advised is two periods of eight days with an interval of seven days. The dose for adults is two enteric-coated tablets [this term is not explained] each containing half a grain of gentian violet given three times a day before meals for those under 15 years it is 1 centigramme a day for each year of apparent age. Of the patients 103 showed no reaction there was nausea in 24 vomiting in 23 diarrhoea in 17 griping in 15 constipation or dizziness each in 2 headache in 1. The course is relatively cheap and is easy to give an important point when many in a household have to receive treatment.

C L

MOREAU (P) Valeur des pulvérisations insecticides dans la lutte antimalarienne. [Value of Insecticidal Sprays as an Anti-Malarial Measure.]—*Rev Méd Française d'Extrême-Orient* 1938 Mar Vol. 16 No 3 pp 264-274. With 2 figs.

The author gives a résumé of recent work on insecticidal sprays for the destruction of adult anophelines in dwellings and pays special attention to the work of Park Rosa [this *Bulletin* 1937 Vol. 34 pp 59-60] in Natal, which he visited. He describes experiments carried out in the laboratory and in the suburbs of Hué Annam. As there are local grave disadvantages in the use of an inflammable solvent for pyrethrum preparations the author made use of a watery emulsion of pyrethrins prepared by a French firm. It is put up as a concentrated extract in tins its pyrethrin content is 5.5 per cent. Diluted with water it forms a stable, homogeneous suspension that is easy to spray. As pointed out by SHERROD and WATTS [this *Bulletin* 1936 Vol. 33 p. 255] better results are obtained with high temperature and low humidity. A daily spraying, about 5 p.m. with a 1 per cent. dilution of the concentrated product enabled one to pass the night, after the second day in a treated house without being bitten. Whereas before treatment two persons were able to catch upwards of 100 mosquitoes in this house, in an hour daily attempts at catching mosquitoes after the third day of treatment were invariably negative. The native house in question had the door and its three windows open the greater part of the day and there was an air space between walls and roof. In spite of these conditions one litre of the diluted insecticide for each 200 cubic metres of space was sufficient to secure the absence of mosquitoes for 24 hours.

The spraying apparatus used was Geneste and Herscher's disinfectant spray such as is used in large hospitals for formalin spraying etc. The container holds ten litres. The jet is powerful and diffusion perfect.

The author concludes that such a method should be used if and when it is necessary to break temporary contact between a community and a hyperinfecting domestic anopheline fauna. Thus it could be used to cut short a localized epidemic or to protect a camp in an epidemic area. It does not replace, but is a valuable addition to classic methods of prophylaxis.

N W

WASSILIEFF (A.) La lutte antilarvaire, en Tunisie, doit-elle être saisonnière ou continue? [Ought Antilarval Measures in Tunis to be Seasonal or Continuous?]—*Arch. Inst. Pasteur de Tunis* 1938. Mar Vol. 27 No 1 pp 31-41

In Tunis *Anopheles* breed the whole year through. Anti-larval measures must therefore be carried on without intermission but the nature of these measures should be modified from time to time as determined by biological observations carried out in each locality. For example, floods following heavy rains clear the ovals or water courses of larvae. These larvae may be carried far afield to where temporary breeding places are formed in ditches, ravines or any low-lying ground. These temporary breeding places then call for the attention that was previously given to the water-course. Photographs taken from an aeroplane have been of value by indicating all collections of water left by floods that need attention. There are

also permanent breeding places especially in the oases. Here antilarval measures if persistently carried out should be most successful the breeding places in many cases are not numerous and the nearest outside breeding places may be tens or hundreds of kilometres away *Gambusia* have been of the greatest value To obtain the best results with *Gambusia* it is necessary to keep the water free from too dense an algal growth and to remove other obstacles such as dead rushes which may prevent the fish from obtaining access to larvae During floods when no larvae are found in water-courses adult anophelines may be found in unusual numbers in houses bordering the streams An attack on adult *Anopheles* in these conditions may be productive of good as indeed at other times

N II

COLLIGNON (E) Une grande mesure antilarvaire l'assèchement du lac Halloula. [A Major Antilarval Work the Draining of Lake Halloula.]—*Arch Inst Pasteur d'Algérie* 1938 June Vol. 16 No 2 pp 166-175 With 4 figs. on 2 plates & 2 text figs

Sixty two kilometres west of Algiers is a small village Montebello three kilometres from the sea from which it is separated by a range of hills Montebello has a population of 169 and has had an unenviable reputation for malaria Lake Halloula close to the village afforded plentiful and inaccessible breeding grounds for anophelines The lake has been drained by means of a tunnel through the hills with the result that the spleen index which was 60 in 1932 had been reduced to 7 in the corresponding period of 1937 The canal began to function in the spring of 1935 During the progress of the work large labour forces caused a temporary increased prevalence of the disease

N IV

DEBUSK (C K.) Water Conservation a New Problem in Malarial Control—*Texas State Jt of Med* 1938 Apr Vol. 33 No 12, pp 826-828. [Summary taken from *Public Health Engineering Abstr* Washington 1938 Nov 5 Vol. 18 Signed Fred G KALLMEYER.]

Pioneers in Texas through necessity conserved water in rain barrels for themselves and in stagnant ponds for their live stock and thus created additional breeding places for mosquito millions.

There is a justifiable apprehension on the part of some that this is about to be repeated on a large scale due to the great water conservation program throughout Texas Projects under construction and contemplated will create about thirty-five major reservoirs with possibly thousands on the tributary streams. Backing the water up and spreading it out into the lowlands along the river valleys may lead to an acute problem in the matter of malaria control threatening to destroy the results of so much time and energy which have been devoted to the task of eliminating mosquitoes and their breeding places. Improper impoundment of water has been known to bring a return of malaria to sections that for years have been free of the disease.

There is a serious need for the conservation of water for beneficial uses including irrigation and to protect the health of the people by

preventing through proper conservation methods the pollution of these waters to an extent that will render them unfit for human use. The conservation of surface waters is of extreme importance also from the standpoint of the underground supply. In all sections of our State there has been a serious recession of the water level and in many sections of the State it has fallen as much as 150 feet.

If the necessary antimalarial measures are taken, there should be no danger of increasing the extent of malaria or introducing it into new areas. Dams should have gates and flash boards to permit lowering of water levels at the proper time. The basin should be cleared of all trees and brush should be piled and burned to prevent the storage of trees and brush should be cut back a sufficient distance from the high water contour to permit inspection and to prevent these growths along the shallow water edges from holding storage. It is recommended that the water level be maintained at this maximum elevation during the winter and early spring in order that the edges of the reservoirs may be flooded to prevent the early growth of land vegetation. Then later on in the summer the water level should be lowered quickly to strand storage and larvae in the shallow areas and wave action in the deeper portions of the lake should prevent anopheline breeding. Larvicides of various chemical content, oil, kerosene or other sprays can be used in special locations. *Gambusia* commonly known as *top minnows* are very helpful.

In East Texas the contemplated region-wide program will eliminate a large portion of the swamp areas where water now stands for long periods and creates ideal mosquito-breeding conditions. It is intended to make mosquito control an integral part of the Sabine Naches conservation district program and to embody preventive measures in the plans, construction and maintenance of the project.

(Discussion Dr. Henry Tucker) I am very hopeful that a plan of impounding the spring floods in large reservoirs of rippling sun-reached water whose level can be controlled and where it can be released through proper channels to prevent the accumulation of dead and stagnant surface and back water will produce a permanent condition similar to that which now exists only in the driest months, and prove to be a big forward step in malaria control in East Texas.

HENMAN (E. Harold) Biological Effects of Fluctuation of Water Level on Anopheline Breeding.—*Am. J. Trop. Med.* 1938. Sept. Vol 18. No. 5 pp 483-495 With 5 figs & 2 graphs.

In reservoirs in Alabama *Anopheles quadrimaculatus* breeds in great numbers if there is much dead floating material or much growth of vegetation in the shallow water round the edge. If the level of the water is caused to fluctuate once a week much of the vegetation is killed, and some of the floating material is stranded, so that the shore line becomes nearly clean and breeding places are much reduced. The intention is mainly to render much breeding of *Anopheles* impossible. It is not claimed that if breeding is going on many of the larvae can be killed. Artificial raising and lowering of water level should, therefore, be undertaken in spring before the insects multiply.

It seems that no catching stations were in use and no measure is given of the reduction in mosquitoes which resulted from what was done.

P. A. Buxton

EJERCITO (Antonio) Biological Control of *Anopheles funestus minimus* Subgroup breeding in the Philippines, I. A Critical Study on Biological Control of *A. minimus* var *flavirostris* as an Anti-Malaria Measure at the Hacienda Tala, San Jose del Monte, Bulacan.—*Jl Philippine Islands Med Assoc* 1938 July Vol 18 No 7 pp 415-435 With 1 map & 1 folding graph

This is an account of the control measures undertaken in a hacienda in which extensive breeding of *A. flavirostris* in numerous streams was responsible for high malaria incidence among a floating population. The biological control measures consisted of clearing or sun exposure of breeding places, construction of a series of dams to cause stagnation of the water, sloping of stream banks with straightening of edges at water level and channelling. The work was begun in January 1935 and continued to the end of 1936 when the Hacienda Tala had to cease operations owing to lack of financial support. In the meantime there was decreased anopheline breeding, decreased adult anopheline prevalence and decreased malaria incidence results which the author attributes to the measures undertaken, incomplete though they were. He endeavours to justify this conclusion at very great length. N W

TILLI (Pietro) Le moderne tecniche agricole impongono l'estensione della disanofelizzazione con calciocianamido [Use of Calcium Cyanamide to combat Anophellinae].—*Riv di Malarologia* Sez I 1938 Vol 17 No 3 pp 225-230 With 3 figs French summary (8 lines)

This is a discussion of an American agricultural method of treating arid soils by the construction of barrage-reservoirs. Deep parallel trenches are dug to capture and retain the rain. In malarial countries this may provide facilities for anopheline breeding. To combat this danger the author advocates the use of calcium cyanamide, a powerful larvicide and a useful fertilizer. N W

AMBIALET (R.) Sur un essai de destruction de gîtes à larves d'anophèles par la méthode de Williamson (herbage cover) [Attempted Destruction of Anopheles Breeding by Herbage Cover].—*Arch Inst Pasteur d'Algérie* 1938 June Vol 16 No 2 pp 161-165 With 2 figs. on 1 plate

This is a description of an attempt at eliminating the breeding of *A. maculipennis* in a water-course close to a village in the Department of Constantine, Algeria, by WILLIAMSON'S Herbage Cover Method [this *Bulletin* 1935 Vol 32 pp 429-430]. In this village the malaria season is from June to November at which period the water-course is a streamlet linking up a series of pools. At the end of April two kilometres of this water-course were treated as recommended by Williamson. The author's experience indicates that the method does not lend itself to a wide application in Algeria. There was certainly a disappearance of anopheline breeding coinciding with the period of fermentation of the herbage cover, this was of limited duration, however, less than two months. Subsequently there was a recrudescence of anopheline breeding. The disadvantages, a nauseating stench and an abundance of culicines, are certainly not negligible for dwellers in the vicinity. N W

BLACKLOCK (D B) A Device for applying Oil or Other Liquids to Flushing Cisterns.—*Amer. Trop. Med. & Parasit.* 1938, Aug. 2, Vol. 32, No. 2 pp 109-114 With 3 figs. [Summary appears also in *Bulletin of Hygiene*]

Although the introduction of piped water supplies and water carriage sewerage in the tropics offers a most important means of eliminating various diseases which depend upon human excreta for their propagation it is attended with the risk of mosquito breeding in the flushing cisterns for water closets, urinals and slop sinks. This paper describes various attempts which have been made to mosquito-proof these water cisterns and describes what is claimed to be a very effective device for discharging the necessary quantity of an oil on to the surface of the water in the cistern as soon as the "flush" of the cistern has taken place. The oil used consists of 88 parts of fuel oil, 10 parts of kerosene and 2 parts of castor oil and the charge amounts to 15 drops of this mixture at each pull of the chain.

The apparatus has been tested with anopheline and culicine larvae and has proved effective in killing them. *H T Calvert*

HILL (Rofia B) Método de profilaxia anti-acumática em Portugal. Conferência realizada no Instituto Rocha Cabral em Maio de 1938 [Anti Malarial Measures in Portugal].—30 pp 1938. Lisbon. Imprensa Lucas & Co.

ROY (D N) A Note on Shute's Technique of enumerating Sporozoites in an Emulsion of Salivary Glands.—*Jl Malaria Inst of India.* 1938 Sept. Vol 1 No 3 pp. 335-337

The author's experience with Shute's method of counting sporozoites in emulsions of salivary glands has not been satisfactory. Having determined the sporozoite content of the emulsion by counting in a Thomas Zeiss counting chamber dilutions were made with sterile salt solution. The number of sporozoites in the dilutions bore no proportionate relationship to each other nor to the sporozoite content of the original emulsion. Similar discordant results were obtained with sporozoites killed with formalin made up to a 1 per cent formalin emulsion and diluted to various strengths. The author's explanation of these results is that the sporozoites have a tendency to adhere to the inner surface of the glass utensil used. The result is that an emulsion leaving a syringe may contain a considerably smaller number of sporozoites than the estimated dose. *N W*

HAWITT (Redginal) The Cultivation of *Plasmodium calhamerium* for One Asexual Generation on Inactivated Egg and Rabbit Serum.—*Amer Jl Hyg* 1938 Mar Vol 27 No. 2 pp 341-344

The author has introduced into a medium consisting of inactivated whole egg slants covered with 10 cc. of 0.9 per cent. saline containing 0.5 per cent. dextrose and serum of a bird or rabbit, blood from a bird with a heavy infection of *Plasmodium calhamerium* and has noted that if incubated at 37°C. the young intracorpuseular parasites grow into fully formed schizonts, though less rapidly than they do in the blood of control birds. The merozoites formed do not appear to leave the host cells in the culture tubes. *C M Weyon.*

HERMAN (Carlton M) Mosquito Transmission of Avian Malaria Parasites (*Plasmodium circumflexum* and *P. cathemerium*)—*Amer Jl Hyg* 1938 Mar Vol. 27 No 2 pp 345-350

The author has tested the transmitting powers of a number of mosquitoes (*Culex pipiens* *C. apicalis* *Aedes sollicitans* *A. canadensis* *A. cantator* *A. vexans* and *Theobaldia melanocera*) with *Plasmodium circumflexum* and *P. cathemerium* of birds. Of the mosquitoes the last named successfully transmitted *P. circumflexum* while *P. cathemerium* was transmitted by *C. pipiens* and *A. sollicitans*. From the differences in susceptibility of *A. sollicitans* to different races of *P. cathemerium* it seems that one or more varieties may be included under the one name. C M W

KIKUTH (Walter) & MUDROW (Lilli) Die endothelialen Stadien der Malaria-parasiten in Experiment und Theorie [The Endothelial Phases of Malarial Parasites in Experiment and Theory]—*Zent f Bakl* I Abt. Orig 1938, Aug 18 Vol. 142, No 3/4 pp 113-132. With 15 coloured figs. on 2 plates. [36 refs.]

The authors results deal mostly with *P. cathemerium* infections in canaries as well as with other bird plasmodia. Following sporozoite infection of these birds unpigmented forms (E forms) were found in the endothelium of inner organs and in brain capillaries and their numbers increased with increase of parasites in the blood. These E forms could be transmitted to fresh birds by inoculation with suitable blood or organ emulsions. The liver and brain were found to be richest in E forms but a positive result did not depend on the tissue used (brain lung liver spleen). More positive finds were made the later up to a point the inoculation from previously infected birds was made except where the canary was killed immediately following sporozoite inoculation and its blood used. The mortality amongst the birds was greater and the duration of infection longer in the presence of E forms. As the blood infection dies out the E forms become fewer and may appear in fresh birds inoculated with material negative as regards such forms. The question whether erythrocytic forms can give rise to E forms or whether a chance E form gradually acquires greater virulence has to be considered.

The presence of E forms with one or more nuclei following inoculation of canaries with different strains and types of bird plasmodia was substantiated including those of *Pr. praecox* (*P. relictum*) strains isolated from a crow greenfinch and magpie. These pigmented forms were similar to those of *P. cathemerium* and were present in the same types of cell, being however less numerous and present over a shorter period of time. The *Pr. praecox* strain from a crow could not be passaged in canaries while a circumflex strain isolated by the first author and passaged by blood inoculation failed to give rise to E forms.

Canaries inoculated with *P. cathemerium* sporozoites and killed at definite intervals showed single or multiple nucleated E forms earliest at the site of injection and similar E forms in the liver and in monocytes of lung while pigmented forms were still absent from the blood. Similar findings were made in canaries treated by suitable antimalarial compounds to delay blood infection. Later the brain contained more E forms in its capillaries than the liver and this is

true of *P. gallinaceum* from the start. The unpigmented forms in large monocytes or macrophages of the lung did not suggest degeneration, and often several occurred in the same cell with, in cases, another parasite. The host cell and nucleus were at times enlarged.

The fact that all over the world unpigmented forms were noted accompanying different types of plasmodial infection suggests that these E forms did not arise from a mixed infection. While these forms in the different cases are morphologically similar they differ in time and duration of appearance as well as in cell habitat and in numbers present. The forms are absent in healthy birds and there is no support for the view that a virus infection may play a part. Controlled infection by insect vectors led to the same view.

The author is of the opinion that these E forms play a definite rôle in the malaria cycle. The view that they belong to the toxoplasma group is refuted, since the latter group is not specific as regards the host whereas E forms are host-specific. Moreover no toxoplasma forms were found in malaria vectors and further their appearance is different from that of E-forms.

The literature is reviewed regarding the early developmental cycle of bird plasmodia and it is noted that early descriptions of pigment free forms agree with those of the present E-forms whose nature, habitat and persistence in different plasmodial infections is recorded. Pigment-free forms have been described as occurring in monkey and human malaria, and those of the latter resemble the forms which are found in bird malaria. The embryology of the various parasites is discussed and also the question of relapse in malaria in relation to E-forms. It is not yet certain whether erythrocytic forms can return to endothelial cells.

J. D. Fulton

HEGWER (Robert) & ESKRIDGE (Lydia) Susceptibility of Young Red Cells to the Merozoites of Avian Plasmodia.—*Amer. J. Hyg.* 1938 Mar Vol. 27 No. 2 pp. 471-492. With 10 coloured figs on 1 plate. [38 refs.]

In the study of bird malaria very little attention appears to have been paid to the age of the red cells into which the merozoites penetrate. The author has studied infections of *Plasmodium relictum*, *P. circumflexum* and *P. elongatum* from this point of view in canaries, pigeons and chickens and in a wild red-winged blackbird. As regards age the red corpuscles of the bird are divided into five categories recognizable from the character and shape of the cytoplasm and the nucleus. It is found that in over 90 per cent. of cases the merozoites enter the young cells of the second or third category. The five categories of cells, infected and uninfected, are illustrated in a coloured plate.

C. M. W.

YOUNG (Martin D.) Comparative Pathology of Infections of *Plasmodium rouxi* in Canaries with Other Malarías of Birds, Monkeys, and Man.—*Amer. J. Trop. Med.* 1938 Jan. Vol. 18 No. 1 pp. 85-99 [12 refs.]

The pathological changes produced in canaries by the mild *Plasmodium rouxi* infections have been compared with those following

the more severe *P. cathemerium* infections in those birds. The severe infection produces a more rapid response on the part of the spleen, liver and bone marrow. Thus there is in the spleen in the case of the severe infection a rapid activation of the lymphoid follicles and lymphocytes and an increase in the mononuclear cells of the red pulp whereas in *P. rouxi* infection the activation is limited to the mononuclear cells of the red pulp. Similarly there was less immediate activation of the bone marrow and liver in the case of the mild infection. In consequence of the milder response the organs in the case of *P. rouxi* infections remained in a state of hyperplasia for longer periods after the crisis an indication of the less intense immunity response which was reflected in the inefficient resistance to superinfections. The pathological changes brought about by malarial infections in monkeys and man correspond more closely with those in canaries infected with *P. cathemerium*. It appears that the resistance to superinfection is correlated with the degree of phagocytosis carried out by the macrophages during the acute phases of infection. Where there is a very acute infection there is much phagocytosis and a resulting well developed immunity to superinfection. C M W

JAMES (S P) & TATE (P) Exo-Erythrocytic Schizogony in *Plasmodium gallinaceum* Brumpt, 1935 — *Parasitology* 1938 Jan Vol. 30 No 1 pp 128-139 With 18 figs. on 2 plates [24 refs]

In this paper the authors describe observations they have carried out on the endothelial schizogony or what they suggest calling it the exo-erythrocytic schizogony of *Plasmodium gallinaceum* of fowls. They have noted that these schizonts are not discoverable in the young chicks infected by mosquito inoculations till intra-erythrocytic forms are present in the blood. They first make their appearance in the brain and then extend to other organs the spleen being next in importance to the brain in the number of exo-erythrocytic schizonts it contains. The schizonts appear not only after infection by sporozoites but also after blood inoculations. Observers who have found similar forms in birds infected with *P. relictum* have noted that as far as present observations go they occur only after infections due to inoculation of sporozoites. The close resemblance of the exo-erythrocytic schizonts of species of *Plasmodium* to those of species of *Haemoproteus* is emphasized. The size of the schizonts varies considerably and in consequence the number of merozoites produced, thirty to fifty five or more. During growth of the schizont division into a number of cytomeres occurs the merozoites being formed from the surface of the cytomeres. It is noted that there are two types of schizont the one staining deeply and possessing little chromatin and the other staining a pale blue with Giemsa and having much chromatin. The number of exo-erythrocytic schizonts in the capillaries of the brain may be so great that the fowls die with symptoms of general paralysis. This may also occur in birds which appear to have been cured of the peripheral infection by quinine treatment.

The paper is illustrated by two excellent plates while the records of other workers are discussed in the light of the authors own observations. C M W

CHROME (V) Modification quantitative des protéides sériques au cours de l'infection due au *Plasmodium gallinaceum* chez les poules. [Quantitative Change in Proteids in *P. gallinaceum* Infection of Fowls.]—*C. R. Soc. Biol.* 1938. Vol. 127 No 5 pp 391-393

During the course of *Plasmodium gallinaceum* infections in fowls the blood shows a progressive increase in total proteins (10 to 40 per cent.) which is due chiefly to an increase in the globulins though the albumin is also increased in amount. Sometimes the albumin is slightly decreased during the acute phase of the infection. C M H

CHRISTOPHERS (S. Rickard) & FULTON (J. D.) Observations on the Course of *Plasmodium knowlesi* Infection in Monkeys (*Macacus rhesus*) with Notes on its Treatment by (1) Atabrin and (2) 1-11 Normal Undecano Diamidine, together with a Note on the Action of the Latter on Bird Malaria.—*Ann. Trop. Med. & Parasit.* 1938 Oct. 12 Vol 32. No 3 pp 257-278. [10 refs.]

The authors have recorded a number of observations of interest and practical importance made on 150 monkeys infected with *P. knowlesi* during routine laboratory procedure in maintaining the strain and providing material for experiment. The fatal character of the disease has not altered during six years continuous transmission by blood inoculation. The course of the disease in *Macacus rhesus* monkeys is one with a primary attack of great intensity invariably fatal if not treated, followed in those treated, by relapse-like attacks which may also prove fatal, a state of chronic infection, and a period when parasites are still present in the blood, as well as a further period in which although clinically recovered the animal can still be shown to be infected.

Parasites appear in the blood from 2-10 days after subcutaneous inoculation. For 122 animals the average period was 5-6 days. Survival after the 6th day following appearance of parasites is rare. The average time of death from the date of inoculation was 10-8 days. The periodicity was determined as approximately 24 hours, segmentation almost invariably occurring at 12 noon. Different stages of development of the parasite may be seen microscopically with advancing infection, which takes place in step-like fashion and is generally accompanied by severe anaemia. In splenectomized animals the increase in numbers is more regular.

Gametocytes are seen in the later stages of the infection, females being more numerous than males. Out of 148 animals only 8 had haemoglobinuria generally seen late in the attack. Spontaneous disappearance of parasites may occur apart from the type of treatment a year or longer after inoculation, but evidence of infection after 533 days was also obtained. This type of infection is valuable in chemotherapeutic studies. Various criteria regarding the efficacy of a drug have been employed such as saving of life in the primary attack, disappearance of parasites and length of a parasitic interval following drug administration, as well as total period of infection and sterilization. Atabrin proved very effective in treatment but relapses were invariable, independent of time of administration and dosage and the total duration of infection was not influenced by the amount of drug given.

In testing the effect of 1:11 normal undecane diamidine it was found that the drug was active in *P. knowlesi* infections. Five out of eleven animals survived the primary attack and four were saved. Its action is slower and less certain than that of atebirin. The young forms of parasite were specially affected. Evidence of kidney and liver damage was seen in sections but no methaemoglobin was found. *In vitro* experiments showed marked inhibition of respiration. The same drug is ineffective against *P. relictum* infections of canaries.

J. D. Fulton

MISCELLANEOUS.

BARDSWELL (Noel Dean) Tuberculosis in Cyprus. An Interim Report on its Incidence and Means of Control made under the Auspices of The National Association for the Prevention of Tuberculosis.—pp. vi+228. With 9 maps (2 folding) 3 graphs 34 figs. & 1 plan. 1937. London. National Association for the Prevention of Tuberculosis. [Summary appears also in *Bulletin of Hygiene*]

The purpose of the Mission to which this report refers was to determine by a survey the amount and distribution of tuberculosis in Cyprus and by this means to discover whether any sound basis exists for the statements which had been made as to the unusual prevalence of the disease among the people. The most significant result of the inquiry is that the tuberculosis problem is by no means so menacing as it was considered to be. The disease presents itself in much the same character intensity and distribution as in similar countries, perhaps even in a less degree. The problem is therefore of manageable proportions.

The author used the percutaneous test of Moro in his investigations on the rate of infection. The tuberculin ointment consisted of equal parts of old tuberculin and lanolin prepared and sent out fortnightly from Edinburgh. It was considered that the use of the intradermal test would have been unwise in view of the attitude of the Cypriot parents, nervous and apt to withdraw co-operation should any untoward happening occur which could be attributed to the test. The author claims that there is little or no difference between the sensitiveness of the von Pirquet and Moro methods. School-children were tested in this way. Of 8,084 children in villages, 6.5 per cent were found to be positive. Of 1,841 in towns, 8.2 per cent. were positive. In many villages evidence of infection could be definitely associated with a tuberculous person.

Patients who had previously been notified as suffering from tuberculosis were examined, so far as this was possible in certain towns and villages. In a population of 178,434 there were 386 cases on the live register. On investigation 91 were found to have died, the diagnosis was confirmed in 106 and was not confirmed in 18. The remainder were not seen. Twelve further cases, not notified, were found. A report by Dr BEVAN shows that of 173 notified cases in the Larnaca District, 98 were dead the diagnosis in 21 was confirmed and in 10 was not confirmed on examination and the rest were not seen. It is estimated that in this district there are about 0.8 cases of tuberculosis per 1,000 and in Larnaca town about 1.5 per 1,000.

Many of the patients presented signs of chronic pulmonary tuberculosis of the fibroid type and cases of acute disease were not common.

The living conditions of the Cypriots are poor their houses dark and ill-ventilated, but the brilliant sunshine which is experienced for the greater part of the year must play a considerable part in killing the tubercle bacilli exposed to it. Tuberculosis is therefore largely spread among intimate house contacts.

Malaria was not found to influence the incidence of tuberculosis.

The report is well illustrated with photographs. An index would be a useful addition to facilitate reference to the points made.

[It is impossible in an abstract to do justice to this report Dr Bardswell wrote in a fascinating manner and in the short time at his disposal collected a mass of information which is given in detail. The survey of primitive or semi-primitive people is not an easy matter and the arguments against using the Mantoux test are very strong but it would be unwise to compare too closely the results of the Moro test carried out with tuberculin not freshly prepared with those obtained elsewhere by the use of freshly diluted tuberculin administered by the Mantoux technique X-ray diagnosis was apparently not attempted to any extent in the investigation and physical examination was the standard test with or without sputum examination An error is made (p 75) in the reference to the work of the reviewer (*Bull of Hygiene* 1938 Vol 13 p 628) who found a morbidity rate (which he did not claim to be an exact picture of the actual position) of 11.55 per 1,000 in 9,866 Natives of Tanganyika Territory This figure is wrongly given by Bardswell as the mortality rate] C W

CUMMINS (S. L.) WILCOCKS (Charles) COCHRANE (E.) BRADFIELD (E. W. C.) BARDSWELL (N. D.) DAVIES (H. N.) COOPER (Mrs Martin) *The Control of Tuberculosis in Tropical and Sub-tropical Regions.—Trans 25th Ann Conference Nat Assoc for Prevention of Tuberculosis* 1938. pp 129-166 With 2 maps (1 folding) & 3 figs. [Summary appears also in *Bulletin of Hygiene*]

This volume gives the papers read by many speakers covering the subjects of the employment of ex-patients the boarding-out of children from tuberculous households anti tuberculosis activities in rural areas the family and tuberculosis and the mental aspects of tuberculosis The section which will most interest readers of this *Bulletin* however is that devoted to the control of tuberculosis in tropical and subtropical regions

In opening the session the Marquess of DUFFERIN and AVA remarked that an increase in tuberculosis has recently been reported in many British Colonies and that in some it is already one of the chief causes of death. Professor S. Lyle Cummins gave an account of the early investigations into the tuberculosis of native races [of which he himself is one of the pioneers] and quoted the findings of BORREL in the Senegalese troops and those made by the British in the South African Native Labour Corps in France during the war In the circumstances these Natives showed an enormous mortality 221.9 per 10,000 in the case of the South African Native Corps. In Africa the Natives appear to show a resistance to the onset of tuberculosis far more effective than the immunity they develop to the disease when once started which is of a low order Under natural conditions of village life infection very often leads to no more than a positive tuberculin reaction

Wilcocks outlined proposals similar to those detailed in this *Bulletin* 1938 Vol. 35 p 629 Cochrane gave an account of the work done in British Guiana [see also *Bull of Hygiene* 1937 Vol 12 p 739] Important measures instituted were the examination of contacts and the introduction of collapse therapy which has been applied to 42 patients with considerable success. Bradfield described the position in India where 2,000,000 persons are estimated to be suffering from tuberculosis. It is intended to allot 75 per cent of available funds to organizations primarily of a preventive character and the dispensary

is to be the pivot of the whole scheme which is now thanks to the King Emperor's Anti Tuberculosis Fund, being actively inaugurated.

Bardswell described the conditions encountered during his investigations in Cyprus. A summary of his report on that country is given above.

Davies has been actively engaged in tuberculosis work in Tanganyika Territory for 11 years. Infection and disease spread primarily in the homes of sputum positive patients. He considers that natives showing a strongly positive tuberculin test have acute foci in a lymphatic node only waiting to spread after further stimulus. It has been found that contacts showing strong reactions have gradually lost the intensity of response to tuberculin and gained in health after the removal or death of the sputum positive persons responsible for their infections.

The capacity to resist infection—that is to prevent infection from progressing to disease—depends upon the dose received, the general immunity and the removal from further massive reinfection.

Patients with advanced disease rarely live more than two years after first being diagnosed. Since 1933 pneumothorax treatment with supplementary surgical measures has been applied to 261 patients under conditions of great difficulty in hospital and dispensaries on the slopes of Kilimanjaro. A village settlement has been constructed and is now occupied. In general, Davies corroborates the findings of Wilcocks in the same Territory [*Bull. of Hygiene* 1938 Vol. 13 p. 628].

[From his knowledge of Davies's work the reviewer can confirm the success of his methods and the arduous nature of the task. The importance of this demonstration of the success of modern methods in the treatment of native tuberculosis cannot be over-emphasized. It is the largest undertaking of its kind in East Africa. See also below.]

Mrs. Martin Cooper described the anti-tuberculosis work being done in Jamaica. C IV

DAVIES (H. N.) The Work of a Tuberculosis Unit in East Africa.—*Tubercle* 1938, Nov. Vol. 20 No. 2 pp. 76-88. With 6 figs. 1 map & 1 graph. [Summary appears also in *Bulletin of Hygiene*.]

This is an account of the work done by the tuberculosis unit which includes a hospital and 10 outlying dispensaries at Kibongoto on the slopes of Kilimanjaro Tanganyika Territory and a branch hospital in the Pare mountains, under the direction of the author from 1927 onwards. Considerable numbers of patients suffering from tuberculosis had previously been reported from this part of Tanganyika Territory and it was decided that the disease was prevalent enough to warrant special measures.

Investigation was conducted by means of the Mantoux test using a dilution of 1 in 10 000, and by the examination of natives presenting themselves at the dispensaries which were gradually instituted. Special attention was paid to those with chest complaints, and a feature of the work was the examination of the family contacts of cases of tuberculosis. Thus 1 103 contacts of 81 sputum positive persons were examined in one village and 82 further cases of disease and 626 infected persons were found among them. In the same village among 680 positive tuberculin reactors 22 per cent. developed clinical disease within five years. A large percentage of bone and joint cases were found to be contacts of sputum-positive persons. Reports

from the Veterinary Department show that tuberculosis in cattle is negligible

The author repeatedly emphasizes that marked infection and tuberculous disease were found in the members of families where sputum-positive cases existed. He found that persons showing strongly positive tuberculin reactions were comparatively easily precipitated into manifest disease especially if contact was maintained but records investigations which showed that the intensity of these reactions decreased if contact was broken with a corresponding improvement in general health

At the end of 1936 almost 3 000 cases of tuberculosis had been seen by the unit and of these 2,122 were local natives [the population of the whole district was 164 119 according to the 1931 census] Pulmonary tuberculosis was present in 1 441 of which 940 were known to be sputum positive Glandular disease including bronchial adenitis was present in 498 In the classification of 1 000 pulmonary cases (according to the method of Lyle CUMINGS) 51 per cent were acute initial and 53 per cent were in an advanced state [presumably on first diagnosis]

At first only simple sanatorium treatment was given but from 1933 onwards collapse therapy was used and was aided by X-ray facilities which became available then. The X ray apparatus used was that introduced into Tanganyika by the reviewer

Artificial pneumothorax with or without additional measures was given to 219 patients, of whom 200 were followed up Phrenectomy alone was used in 31 cases and in a few others various operative measures were undertaken. In all collapse treatment was given to 261 patients, of whom 238 were traced at the end of 1937 Of these 142 were alive and 96 were working and of these 96 the periods since the commencement of treatment were as follows —

Years	-1	1	2	3	4	Total
Numbers	9	27	12	24	24	96

Comparing advanced cases treated by collapse with similar cases treated by purely medical measures the following table may be constructed of those dying within one year —

Classification	Collapse treatment		Medical treatment	
	Number	Percentage dead	Number	Percentage dead
A.3	87	34	153	92
C.3	100	27	137	73

Recently a village settlement has been started near the hospital, and five or six families live on small farms pursuing suitable handicrafts under close medical supervision. It is hoped to extend this after-care establishment

[The reviewer has some first-hand knowledge of the work of Dr Davies and the difficulties he has experienced and overcome. This work has demonstrated that collapse therapy can be used with success even in native peoples provided that those administering it are patient and enthusiastic. It should stimulate others throughout the tropics to take in hand the treatment of tuberculosis, which is too often regarded as impossible. See also COCHRANE *Bull of Hygiene* Vol. 13 p 874 and WILCOCKS *Ibid* p. 628.] C IV

SMITH (W. Harden) Pulmonary Tuberculosis in Africans.—*East African Med J* 1939 Jan. Vol. 15 No 10 pp. 318-328. [15 refs.] [Summary appears also in *Bulletin of Hygiene*]

This paper is an adequate summary of the work published on tuberculosis in African natives and American Negroes in recent years, with the author's views on method of control. Only two factors are capable of control, namely the open case and the economic conditions. Of the latter housing is the most important, and in rural communities much can be done if the intelligent co-operation of native chiefs is enlisted. In the control of sputum positive cases treatment and segregation are available and it is important that patients who develop the disease away from their own districts should be repatriated and that supervision should be attempted where they feel no sense of strangeness. The work of the tuberculosis hospital at Kibongoto Tanganyika Territory is quoted as an example of what can be done for patients near their homes.

Tuberculosis is a major problem in Africa and though no dramatic measures are possible, there are many indirect ways in which it may be reduced C IV

CARMICHAEL (J) Tuberculosis. Investigations in Uganda.—*East African Med J* 1938. Oct. Vol. 15 No 7 pp. 220-231 [15 refs.] [Summary appears also in *Bulletin of Hygiene*]

This is a report of valuable work on the typing of strains of *Mycobacterium tuberculosis* recovered from animals and man in Uganda. Tuberculosis is rare in the humped Zebu cattle so common in East Africa, and a post-mortem incidence of only 0.8 per cent was found in 33 627 carcasses inspected. Double intradermal tests on 178 gave one positive result or 0.6 per cent. On the other hand an incidence of 17 per cent was found in the carcasses of 5,908 Ankole cattle inspected. Tuberculin tests on 360 in one district showed 68 per cent. positive. Half of the lesions found are confined to the thoracic cavity. Of 31 strains of tubercle bacilli isolated from cattle all were of the typical dysgonic bovine type.

Three healthy Zebu calves were inoculated with 50 mgm (? subcutaneously) of a standard British bovine strain which normally kills in this dosage, in six weeks. The lesions found in these Zebu calves, however, were local and retrogressive with only slight tendency to generalization. This finding supports other observations on the apparent resistance of the Zebu cattle to tuberculosis.

Tuberculosis was found in 12 sheep in one of which the first recorded instance the human type was the cause of the lesions. Twelve tuberculous goats were seen all infected by the bovine type. No signs of tuberculosis were seen in the human occupants of the huts

in which three tuberculous goats were found. [But it would have been interesting to have tested their reactions to tuberculin.]

In a community in which it is the custom for man and animals to inhabit the same houses it is obviously important to know to what extent disease is transmitted. The bovine type of tubercle bacillus is fully pathogenic for man

The author has typed the organisms recovered from 247 cases of pulmonary tuberculosis in various tribes in Uganda. Four were of the bovine type and were found in tribes which live in close contact with cattle. This proportion corresponds roughly with European figures and the findings serve to demonstrate that the bovine organism plays a part in the epidemiology of tuberculosis in Uganda

[It would be instructive to know if the high rate in the Ankole cattle were reflected in a higher tuberculin rate or morbidity rate from tuberculosis among the natives owning such cattle than is found in the tribes owning Zebu cattle.] C II

KETTELKAMP (G D) MURPHY (Paul) & TRUMPE (Darrell) Results of Treatment of Tuberculosis in the Negro—*Amer Rev Tuberculosis* 1938 Oct. Vol 38 No 4 pp 458-465 [Summary appears also in *Bulletin of Hygiene*]

In recent years more and more evidence is coming to light to show that tuberculosis in the Negro is not the hopeless condition it was formerly thought to be.

The authors have compared the whites and the negroes who constituted two groups of 1 000 consecutive discharges from the Robert Koch Hospital St Louis in 1922-1926 and 1933-1937. No definite manifestations of tuberculosis peculiar to the negro were noticed, and the negroes are very amenable to sanatorium treatment. As a group the whites leave hospital in better condition than do the negroes but the disparity is not so great in the later as in the earlier group. The results in the earlier group varied with race in the later group with sex. Thus in the later 1 000 discharges the (descending) order of desirability of end results was White female negro female white male negro male. On the whole the negroes had more severe symptoms on admission than the whites.

The negroes are now exhibiting a widespread appreciation of the modern methods of combating tuberculosis and a willingness to avail themselves of all the opportunities afforded them.

[These results are of particular interest and value to workers who are introducing the modern methods of treatment into Africa. See also DAVIES above.] C IV

GIOSEFFI (M.) Malaria e tubercolosi. [Malaria and Tuberculosis.]—*Riforma Med* 1938 Oct 8 Vol 54 No 40 pp 1548-1550 [Summary appears also in *Bulletin of Hygiene*]

Three views are held regarding the interaction of malaria and tuberculosis. The first is that there is an antagonism between the two and that malaria confers immunity and aids fibrosis. The second is that malaria predisposes to and aggravates tuberculosis. The third is that malaria has no influence on tuberculosis.

During an epidemic of malaria in Istria the author had the opportunity of studying the question. He examined 1 129 persons from 170 family groups and compared his findings with those made by

LOY in 1,898 autopsies. LOY holds that malaria has a deleterious influence on tuberculosis, and the author's findings making allowance for the fact that they were in living people while LOY's were in autopsies, were not unlike the latter's.

The author finds that well treated malaria has no injurious action on chronic fibrous lesions, but that in active pulmonary tuberculosis malaria exerts a harmful effect by reducing general and local resistance. Attempts to treat tuberculosis by inducing malaria are unjustified, and energetic treatment of malaria in tuberculous persons is essential. It should not be overlooked that loss of weight, oscillations of temperature, chills and sweats are symptoms of tuberculosis, and attention should be paid to the respiratory system in the examination of patients in malarious regions especially if symptoms do not yield to anti-malarial drugs. In such areas also the blood of tuberculous persons should be watched for parasites. C IV

SAX (P. N.) The Problem of Tuberculosis in India.—*Jl Indian Med Assoc* 1938, Dec Vol. 8, No. 3 pp 160-163.

FERRER (Isabel) Treatment of Chronic Ulcers with Formalin.—*Monthly Bull Bureau of Health Manila*, 1938 Apr Vol 18, No 4 pp. 155-158.

Although many chronic ulcers respond to the classical and well tested local treatments commonly used, there are ulcers which resist. Fourteen children with chronic ulcers of one month to two years duration were treated by washing the ulcer with 10 per cent. formalin solution and scraping the necrotic tissues with a cotton ball. Excess of formalin was washed out with sterile water the wound was dried very well with plain cotton and was then liberally painted with saturated gentian violet solution. This was allowed to dry in the sun for 10 minutes and no dressing was applied but the children were prevented from playing in dusty places. In one case this treatment was repeated every other day (presumably though it is not definitely stated, it is preferable to apply it daily).

Of the 14 children four refused to continue the treatment on account of the (little) pain caused by the formalin. These were not yet cured after six months of the usual antiseptic dressings. The remaining 10 children were cured in two or three weeks under the formalin gentian violet treatment. Cost is very small and no dressings are needed. C IV

STROCCHI (Ottaviano) *Lukera tropicale. Curata con applicazioni locali di Neojodo I.C.I. in soluzione.* (*Tropical Ulcer—Local Treatment by Neojodo I.C.I.*)—*Arch. Ital. Sci Med Colon e Parasit.* 1938, Aug Vol 19 No 8 pp. 499-507

The author treats tropical phagedenic ulcer by first cleansing with hydrogen peroxide and then applying gauze saturated with a preparation of arsenobenzol and iodine, which he names "Neojodo I.C.I." This is applied in 3 per cent. solution on alternate days and skin growth is assisted by adhesive plaster (presumably covering the whole). In the later stages, when healing is evident the Neojodo I.C.I. may be used in 1 per cent. solution.

Three cases are described and healing took place in from three to four weeks the ulcers having been extensive and foul at the beginning of treatment. C IV

GOODMAN (M H) Chronic Streptococcal Ulcer of the Skin Unresponsive to Local Therapy but cured by Sulfanilamide Report of Two Cases.—*Jl Amer Med Assoc* 1938 Oct 15 Vol 111 No. 16 pp 1427-1431 With 7 figs

Though the case here described did not occur in the tropics the condition of chronic ulcer is so common there that any treatment found successful is worth noting in order that it may be given a more extensive trial

The patient gave a history of having been bitten by insects six to seven weeks before being seen by the author all the spots had healed and had caused no trouble except two one on the arm and one on the leg These became swollen red and tender and were incised in spite of the local application of antiseptics the sores did not heal but became progressively larger Among the various preparations locally applied without benefit were 3 per cent aqueous-alcoholic gentian violet 10 per cent ammoniated mercury ointment boric ointment compresses of 1:1000 bichloride of mercury solutions of potassium permanganate chloramine T and others. A β -haemolytic streptococcus was isolated. By this time the ulcer had a markedly inflamed necrosing undermined serpiginous border with an uneven glazed granular base discharging a thin yellowish serous fluid Within 48 hours of treatment by sulphanilamide being started healing set in and was uneventful. The initial doses were 60 grains daily (in three doses) reduced gradually to 15 as the healing progressed. A second case in which the chronicity and appearance led to the suspicion of the ulcers being tuberculous but from which streptococci were again isolated yielded similarly to sulphanilamide In a footnote mention is made of a third patient with five large ulcers on one leg and three on the other which had failed to respond even after several months to local treatment but cleared readily with sulphanilamide. H H S

MOVTEL (L. R.) Traitement de la dishydrose et de l'eczéma dishydrosique de Brocq (Hong Kong Foot Athletic Foot) par les dérivés sulfamidés intus et extra [Treatment of "Hongkong Foot" by Sulphamide Derivatives].—*Rev Méd Française d'Extrême Orient* 1938 Apr Vol 17 No 4 p 443

Brocq's eczema known locally in South China as Hongkong foot has been ascribed to at least found associated with *Penicillium Aspergillus* and *Trichophyton pedis* α and β [see this *Bulletin* 1931 Vol. 28 p 396] and with *Epidermophyton interdigitale* [idem 1932 Vol. 29 p 272] others maintain that it is streptococcal. The author supports this last view Lesions may extend beyond the toes and even become a generalized eczema. Preparations containing ichthyol or iodine or salicylic acid have all been reported as beneficial but their action is far from constantly so The author has found sulphonamide derivatives most successful in his cases given internally or in the form of Rubiazol injected intramuscularly or Septazine intravenously Benefit accrues also when 1 per cent. rubiazol is applied locally Apparently these are not alone sufficient for a permanent cure since the use of alcohol iodine salicylic acid is recommended to be used for a long time after cure to prevent relapse caused by the fungal or microbial parasites which infest the skin of parts previously affected. H H S

REVIEWS AND NOTICES.

FINDLAY (G. M.) (C.B.E., M.D. D.Sc. Wellcome Bureau of Scientific Research, London). *Recent Advances in Chemotherapy*. With a Foreword by C. S. Wessely C.M.G., C.B.E., M.B., B.S., F.R.S. Second Edition.—pp. x+523. With 1 chart. 1939. London J. & A. Churchill Ltd., 104 Gloucester Place Portman Square. [21s.]

The eight years which have elapsed since the appearance of the first edition of this book [this *Bulletin* 1930 Vol. 27 p. 1029] have produced such a mass of experimental work on the mode of action of drugs, and have witnessed discoveries of such practical significance that it is not surprising that the author in order to find space for these advances in knowledge, without increasing the size of the volume has found it necessary to re-write the second edition almost entirely omitting much of interest which was contained in the first edition.

The discovery that in the sulphocamide drugs we have chemotherapeutic agents of great value in the treatment of acute bacterial infections—a discovery equal to if not more important than the original introduction of arsenphenamine by Ehrlich—has proved a great stimulus to chemotherapeutic investigations throughout the world. The volume covers an enormous field dealing with the chemotherapeutics of helminthic infections, of amoebiasis, leishmaniasis, trypanosomiasis and malaria, of syphilis, and of tuberculous and leprosy, of the acute bacterial infections and of the virus infections. Curiously enough the spirochaetal infections other than syphilis, and the important infections due to the *phloplasma* group are ignored in the present edition, although an important addition to the therapy of the latter group has been made by the discovery of acapron.

The chapter relating to the chemotherapy of malaria has been extensively revised, and naturally much space is devoted to a discussion of the new synthetic compounds plasmoquine and atabrin. The great amount of experimental work which has been done during the last 10 years on the mechanism of the action of drugs and on the significance of drug-resistance has necessitated the complete re-casting of the chapter on the chemotherapy of trypanosomiasis.

As, however, might be anticipated the main change in the book is found in the chapter dealing with the chemotherapy of acute bacterial infections. How intense has been research on this subject since the discovery of the anti-streptococcal activity of prontosil by Mietzsch and Klarer in 1932 can be judged from the fact that the space devoted to the treatment of acute bacterial infections has been increased from 34 pages in the first edition to 164 pages in the present edition.

Valuable lists of references are given at the end of each section, making it easy for the reader to pursue more fully any point dealt with in the book. An important innovation in the present edition is that an author's index has been added to the subject index at the end of the book.

In the reviewer's opinion it would be difficult to write too highly of this most excellent work. Not only will it prove most useful to the laboratory investigator as a book of reference but it will also be of the greatest practical value to the physician in the tropics and to others who may have little access to current literature.

W. York

INTERNATIONAL LABOUR OFFICE Studies and Reports Ser B
(Economic Conditions) No 26 Labour Conditions in Indo-China.
1938 Geneva. pp 85-92. Medical Protection [Review appears
also in *Bulletin of Hygiene*]

Indo-China is a French colony with some 23 000 000 native population. Economic and social development is rapidly and completely transforming the country the old time family system still dominates home industries, but is being replaced by the industrial system for new mining and industrial undertakings. For this latter purpose contract labour has to be moved to the undertakings. The well being of such labour requires supervision. The workers have to be medically inspected and vaccinated when recruited and repatriated and are under medical supervision during their stay on the plantations. Returns of sickness and death must be made. Medical attention is given during sickness in hospital if serious. If there are 6 000 workers a whole-time doctor must be engaged. Otherwise one doctor may serve several neighbouring plantations. On red lands where malaria is rife 1.75 grammes of quinine must be taken every week mosquito nets are required and other anti malarial measures such as drainage must be adopted. Clearing ground on red lands is particularly unhealthy work but anti-malaria precautions under the auspices of the Pasteur Institute have done good work. In one instance a percentage of deaths of 28.3 in 1927 fell by 1931 to 0. In another the percentage of cases of unfitness for work fell from 20 or 25 to 3. These measures mean an increase of 40 per cent. in the value of labour employed. But they have to be constantly maintained. Control of drinking water has caused the almost entire disappearance of diseases due to bad water. Boots and leggings with antiseptic washes are abolishing troublesome ulcers. Fresh vegetables increase resistance to disease and Java rice is banishing beriberi. The employer is responsible for burial and for finding heirs to any property and deferred pay. The mortality of plantation workers was 5.4 per cent. in 1927 4.5 per cent. in 1928 2.83 per cent. in 1929 and 2.32 per cent. in 1930 all high rates since they apply to persons in the prime of life who were medically examined on recruitment. The whole of this report which deals with the introduction of civilized industry among native races is of great interest.

E. L. Collis

JORGE (Ricardo) *Flèvre jaune* [Yellow Fever]—*Arquivos do Instituto de Higiene* Lisbon 1938. Vol 4 No 1 pp xv+134
With 10 figs. (1 coloured)

The present interest in yellow fever one of the three great traditional pestilences—plague cholera and yellow fever—depends not so much on its ravages in the past as on the succession of recent discoveries concerning its epidemiology and control.

During the past twelve years the distinguished author as the delegate for Portugal on the Committee of the International Public Health Office has taken an active part in the study of the problem of yellow fever and in the present publication has given a graphic description of some of the more important stages in the growth of our present-day knowledge. Very appropriately in view of his official position the author reproduces certain communications and suggestions made by him at meetings of the International Committee illustrating the various points dealt with in this book.

These are considered as three acts of a dramatic film. Africa is the scene of the first act where early this century the existence of yellow fever could no longer be concealed. Then various erroneous theories as to its nature were followed by the foundation of the laboratory at Lagos and the discovery of the susceptibility of *Macacus rhesus*. The second act comprises both Africa and America. In his historical introduction to this section the author states that it is generally admitted that Columbus found yellow fever already present in the Antilles when he discovered America, a view which is opposed to recent studies by Carter and others [see this *Bulletin* 1932 Vol. 29 p. 245] supporting the African origin of the disease. The epidemic at Rio de Janeiro and also those at Dakar and Matadi again called attention to the potentialities of this disease, and each was suppressed by intense anti-mosquito campaigns. The Institute at Manguinhos became an active centre of yellow fever investigation.

In addition the long duration of yellow fever immunity (usually for life) was established by serological tests first in monkeys and then in mice and these discoveries were applied mainly through the help of the Rockefeller Foundation to a delimitation of the endemic areas of the disease by means of protection tests in mice. The surprising results of these investigations discussions on the diagnostic value of these tests and the introduction of the use of the viscerotome in Brazil complete this section.

The third act opens in Brazil with the occurrence of outbreaks of yellow fever in the absence of *Aedes aegypti* and in forest regions where any human origin of infection can be excluded. As a result, the existence of a jungle variety of the disease has been established occurring in wild monkeys and possibly other mammals, and transmitted by species of mosquitoes other than *Aedes*.

The various stages in these discoveries are presented with admirable fairness and impartiality and Dr. Jorge's book constitutes a valuable addition to the literature on the subject which should be read by all those interested in recent developments in our knowledge of yellow fever.

E. Huxley

TROPICAL DISEASES BULLETIN.

Vol. 36]

1939

[No 5

SUMMARY OF RECENT ABSTRACTS *

IV TRYPANOSOMIASIS

Epidemiology

The extent to which trypanosomiasis is prevalent in West Africa is shown by the fact that in Nigeria the total number of cases diagnosed from 1931-36 was 284,933 (MACQUEEN p 697) and in North Dahomey during the period 1932-36 the new cases found numbered 7 702 (BEAULTS p 707)

Artiology

SCHWETZ (p 700) divides trypanosomes morphologically into three groups —

- 1 *Congolense* monomorphic with lateral blepharoplast
- 2 *Vivax* monomorphic with terminal or subterminal blepharoplast.
- 3 *Brucei* polymorphic with subterminal or lateral blepharoplast

The elaborations of these are given in the original abstract

JACOVO (p 327) proposes the generic name *Castellanella* for trypanosomes of conventional type reserving the name *Trypanosoma* for forms similar to those observed in the blood of frogs. This proposal is not accepted as valid by WENYON CASTELLANI and JACOVO (p 327) publish details of a human case in support of this proposed classification

HOARE and BROOM (p 701) found that it is possible in practically all cases to differentiate *T. uniforme* and *T. vivax* by measuring the length of only 10 trypanosomes. If the mean length is less than 18μ the infection is *T. uniforme* if more than 20μ it is *T. vivax*

Working on the respiratory metabolism of *T. rhodesiense* CHRISTOPHERS and GULTOV (p 709) found that the most striking feature was the utilization of glucose the formation of acid products and the large oxygen uptake. Deprived of glucose trypanosomes rapidly become motionless, deformed and lysed and the uptake of

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1938 Vol. 35. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

oxygen ceases. *P. knowlesi* on the other hand, takes up oxygen steadily in the absence of added glucose and independently of the normal presence of this in serum or red cells. Oxygen is taken from haemoglobin which is altered if not actually split up there is no formation of acid. Certain drugs cause inhibition of the oxygen uptake by both trypanosomes and malaria parasites and this may be related to the therapeutic effect. The oxygen uptake gives a continuous record of the lethal effect of a drug, and the experimental method used by the authors is rapid and precise, and provides a ready means of telling whether a strain is arsenic-fast. VON BRAND (p. 712) shows that the carbohydrate metabolism of the pathogenic trypanosomes is very intense but the sugar is only partially oxidized in the presence of oxygen. The carbohydrate metabolism of the host is disturbed. Injury to the host may be due to loss of carbohydrate, or to the lactic acid formed by the trypanosomes or to toxins perhaps originating from protein metabolism of the parasites.

CORSON (p. 333) found no evidence of lowering of virulence of a strain of *T. rhodensis* maintained for nearly three years in ruminants and *G. morsitans*.

Sleeping sickness has become more virulent during the past 6 or 7 years in some localities in Nigeria where *G. morsitans* is not present and there is very little game (MACQUEEN p. 696).

BOURGUIGNON (p. 328) found in the south-east of the Belgian Congo a patient infected with a trypanosome having the characters of *T. rhodensis*. The strain in the guinea-pig was resistant to a dose of 1 gm. per kilo of trypanamide and cyclically transmissible in *G. palpalis*. The exaltation in virulence is probably due to the presence in that region of different species of *Glossina* able to transmit *T. gambiense*.

VAN HOOFF *et al.* (p. 693) investigating the transmissibility by *G. palpalis* of strains of *T. gambiense* from the Congo found that it varied from zero to 10.2 as calculated by the formula (q/v). Differences were found in various endemic zones and the two factors capable of lowering transmissibility appeared to be long sojourn in one host and lengthy drug treatment in refractory cases. Natural resistance of *T. gambiense* to trypanamide is more common than is believed. It can be acquired by passage through unaccustomed hosts, and inadequate treatment cannot be the only explanation.

BRUTSAERT and HENRAED (p. 704) give details of a method of cultivating trypanosomes in a medium containing Ringer solution with NaCl Tyrode solution and citrated human blood. In taking blood however it is drawn into a syringe containing 1 per cent. polymethyl sulphamate of sodium (liquide Roche) instead of sodium citrate. This method is useful in diagnosis when trypanosomes cannot be seen in the blood.

STRODER (p. 717) found that after being subjected to a pressure of 800 atmospheres for 5 minutes trypanosomes were infective but that after 1,300 atmospheres they became rounded, and after 1,400 were non-pathogenic for mice.

Transmission.

VAN HOOFF *et al.* (p. 334) found that preliminary meals on normal blood did not modify the infectibility of *G. palpalis* with *T. vivax* whereas with *T. gambiense* infectibility is decreased. From dissections made of flies fed on non transmissible feebly transmissible and easily

transmissible strains these authors (p 336) in agreement with YORKE conclude that proventricular infection does not necessarily imply ultimate invasion of the salivary glands and does not give any certain indication of cyclical transmissibility. Special long thin forms apparently destined to invade the salivary glands, however may be seen and infection of the proventriculus by these confirms the belief that the normal infection of *Glossina* by *T gambiense* is by the indirect route and dependent upon a preliminary development in the intestine.

VAN HOOFF HENRARD and PEEL (p 335) found that a meal of blood containing trypanamide or Bayer 205 does not destroy *T gambiense* infecting the intestine proventriculus and salivary glands of *Glossina* but some of the flies are no longer able to transmit the infection. Virulence is changed but evolution is not influenced unless the drug is present in very large amounts. No inhibitory action on trypanamide resistant trypanosomes was seen. Analogous results were given with *T brucei* but *T congolense* was not influenced.

Although *G morsitans* at normal indoor temperatures shows positive phototropic reaction to light JACK and WILLIAMS (p 338) found that at temperatures over 30°C. it will seek the dark regardless of the temperature there even if that temperature is rapidly fatal (49°C.) The distribution of tsetse flies in relation to vegetation and other features of their habitat may be explicable to a large extent on the basis of phototropic reactions. BAX (p 337) shows that *G swynnertoni* is attracted by the scent of oxen up to about 180 feet and by the sight of moving oxen up to 450 feet. LLOYD (p 702) points out that in Tanganyika Territory *G morsitans* can live in certain favourable types of vegetation independently of an *Isobertinia brachystegia* community and will not populate cultivated banana plantations in areas where favoured natural types of vegetation are present.

BOURGUIGNON (p 329) considers that the danger of mechanical transmission in the south-east Congo is far from negligible. In certain regions *G palpalis* *G morsitans* *G pallidipes* and *G longipalpis* were all found. Both *G palpalis* and *G morsitans* were found by TARANTINO (p 700) in the west of Abyssinia though no human trypanosomiasis has been seen.

The pupation period of one specimen of *G palpalis* was found by GUIBERT (p 702) to be 31 days.

The native pig of the Congo may be a reservoir of *T gambiense* VAN HOOFF *et al* (p 330) infected pigs both by inoculation and by bite. Parasites are scanty in the blood and there is no pathological reaction and the pig may be infective for at least a year. After cyclical transmission through three pigs in series flies infected from the third produced infection in a human volunteer.

Clinical

CORSON (p 333) found that only two of four human volunteers were infected in an experiment on the transmission of *T rhodesiense* by *G morsitans* and concludes that variations in resistance occur in man since no loss of virulence was observed in the trypanosomes. Inapparent infection in man may not be rare, and spontaneous recovery probably also takes place.

Reviewing the results obtained from the examination of a large series of fresh gland juice preparations stained thin and thick gland juice films stained thick blood films and triple centrifugation blood

preparations, RAOULT (p. 703) concludes that the thick blood film is in general the best method, and that stained gland juice is better than fresh. Stained juice preparations, however, are sometimes positive when the blood is negative. GUTBERT (p. 704) found trypanosomes in the bone marrow of 18 patients who had already been diagnosed, but failed in two in whom the diagnosis could not be made by other means, while VAN DER BRAAKEN concludes from the examination of 25 rats that bone marrow puncture is probably not of much value in diagnosis.

HORN-GILL (p. 705) tested three groups of people with the serum-formalin reaction—patients infected with *T. gambiense* apparently healthy natives from fly free country and out-patients other than detected cases of human trypanosomiasis. He concludes that the reaction (in an area where kala azar is not endemic) if positive within 60 minutes, is strong evidence in favour of trypanosomiasis and if negative at 24 hours practically excludes it. Bayer 205 in the serum retards the end point as does previous treatment with trypanocide. Interference by syphilis is negligible. For the technique the original abstract should be consulted. GUTBERT (p. 706) has devised a simple method of applying the Pandy reaction to the cerebrospinal fluid, which could be used by itinerant sleeping sickness workers. The reagent is carbolic acid crystals 10 gm. in 150 cc. distilled water and the reading made in a nepheloscope. A black ring is negative. Positive readings vary from a greyish ring (slightly positive) through a blue tinge to a white cloud, when the reaction is strongly positive and indicates a protein value of more than 0.5 gm. per litre and usually more than 50 cells per cmm.

SCHWARTZ (p. 702) reports acquired trypanosomiasis in a child less than 20 days old. The child died after remaining in good clinical condition for six months. In Tanganyika Territory (p. 309) a child was seen with *T. rhodesiense* in the blood and enormous numbers in ascitic fluid.

Chemotherapy

It has been pointed out that trypanosomes require for the metabolism a large quantity of sugar (see also CHRISTOPHERS & FULTON above). Synthalin produces hypoglycaemia, and it is thought that possibly its curative action in mice might be due to action. LOURIE and YOUNG (p. 342) however from experiments with trypanosomes *in vitro* conclude that the drug has a direct trypanocidal action, even on atoxyl- and Bayer resistant strains. The effect of insulin was negligible. This finding led KING, LOURIE and YOUNG (p. 343) to test other compounds, of entirely different chemical composition from the known trypanocidal substances, and of these n undecano-11-diamine was the most active, producing permanent cures in laboratory animals. These experiments open up a new field in chemotherapy. BROWNING (p. 716) supports the conclusions of LOURIE and YOUNG that the therapeutic effect of synthalin (which he confirms) is not due to the hypoglycaemia it produces.

A further new type of trypanocidal agent has been found by BROWNING *et al.* (p. 344) in phenanthridinum compounds. Two of these are effective in mice against *T. brucei* (including a strain resistant

to arsacetin) and one is curative in *T. congolense* (and also *Sp. minus*) infections

Testing the toxicity of the glyphenarsines (tryparsamide trypanarsyl etc.) on white rats VAN DEN BRANDEN and PORTIER (p. 349) conclude that if visual troubles or other ill effects in abnormal numbers are produced, the cause is the state of the patient or faults of technique.

MURGATROYD (p. 341) tested the therapeutic action of neocryl on patients with *T. gambiense* infection. A rapid and definite clinical improvement occurred in practically every case treated especially in the early cases with normal spinal fluids. The results resemble those to be expected from tryparsamide but cannot be assessed fully until the later fate of the patients is known. Two other arsenicals K.324 and K.352 were unsatisfactory. MACQUEEN (p. 697) also reports good initial results in the treatment of 60 cases with neocryl. Dimness of vision was a feature in two, one of whom died. The later effects of neocryl treatment were studied by ACRES (p. 341). He found the same rapid initial clinical improvement but before six months after the completion of treatment 2 of 9 first stage and 7 or 8 of 12 second stage patients had relapsed. The drug is therefore disappointing.

STRANGEWAYS (p. 345) shows that thioarsinites (containing trivalent arsenic) are toxic to trypanosomes *in vitro* in high dilution and this is due to hydrolysis and the liberation of the highly trypanocidal arsenoxide. Neoarsphenamine is probably adsorbed and oxidized within the trypanosome or on its surface to arsenoxide.

RADNA (p. 708) uses the intrathecal injection of arsebenyl to increase the permeability of the meningeal barrier to drugs injected in the ordinary way. He reports that 7 patients with abnormal spinal fluids were cured by this means. The technique is given.

As a result of the treatment of 34 patients with anthiomaline BERTRAND (p. 708) concludes that it is of little use when the spinal fluid is changed but is a compound of the first order in producing peripheral sterilization even in cases resistant to tryparsamide. LAUNOY and PRIEUR (p. 350) found that amino-phenylstibinate of methylglucamine had good therapeutic action on mice infected with *T. brucei* and normal *T. annamense*. Naturally resistant *T. congolense* and artificially resistant *T. annamense* responded about equally.

No prophylactic or permanent therapeutic value for guineapigs with *T. gambiense* infection was found by WITTEBOLLE (p. 349) in the use of Trystibine (Dn 18).

BIOZZI (p. 716) tested colloidal zinc silver and copper on *T. brucei* *in vitro* and in guineapigs. All exerted definitely lytic action but the copper preparation Zimocuprolo was the most successful curing the animals on intravenous injection. It causes abscesses if injected subcutaneously.

The chemical composition of Surfen and Surfen C is given by IEWSCH (p. 343) together with references to the successful treatment of *T. congolense* and *T. brucei* infections. A related substance is stated to possess activity against *T. cruzi* which has not been affected hitherto by any chemotherapeutic agent. Surfen C is contraindicated in human trypanosomiasis by the production of acute nephritis. The use of Surfen C in Northern Rhodesia in the treatment of animals led to disastrous results some dying within 15 minutes and showing extensive haemorrhages throughout the lungs though others tolerated the drug fairly well (LE ROUX p. 329). Similarly experiments in the Gold Coast were unsuccessful in cattle though good results were

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obtained in dogs (STEWART p. 330). The most effective drug is still tartar emetic though horses with *T. brucei* infection were cured with nugganol.

TUNG (p. 714) in studying the photodynamic action of methylene blue on *T. brucei* *in vitro* found that in the presence of light a dilution of 1 in 100 000 was sufficient to produce immobilization whereas without light 1 in 100 was required. The immobilizing effect was parallel to the lethal activity and immobilized trypanosomes failed to infect mice. Trypanosomes treated with the photodynamic action in a dilution insufficient to immobilize have a longer incubation period and survival than controls.

STRANGEWAYS (p. 346) states that in neutral or slightly alkaline solutions of glutathione and ascorbic acid exposed to air a substance is rapidly formed which is very toxic for trypanosomes *in vitro*. This is probably hydrogen peroxide.

RADWA (p. 347) concludes that arsenic-resistant trypanosomes are just as chemo-sensitive *in vitro* as normal parasites, but his work is criticised by YORKE. He also observed that agglutinins were present in the sera of treated patients. He therefore used blood transfusion from convalescent patients in addition to chemotherapy. In the treatment of resistant patients Though they did not respond to either method alone the combination produced sterilization.

MEYER and BOCK (p. 335) show that in a patient with trypanosomiasis, diabetes, filariasis, tertian malaria and ankylostomiasis, insulin treatment was not interfered with by germanin and atehrin. germanin appeared to provoke the latent malaria. *M. diurnus* was uninfluenced by the treatments, and germanin was effective in spite of the complications.

Prevention.

DANGERFIELD GAUNT and WORMALL (p. 714) have described a method of determining Bayer 205 in plasma, but difficulties are present in applying it to urine. After intravenous injection the amount in the plasma (of rabbits and dogs) falls rapidly for the first few days, but it can still be found after 6 months, especially if administered in several small doses. This persistence may account for the marked prophylactic action of the drug. The prophylactic action of moranyl on a community of 621 individuals in the Congo was studied by OXLOVITCH (p. 340). Twenty new cases of disease were found in 1934 and this was repeated twice at 3-monthly intervals. Examinations made regularly on considerable numbers up to 3 months after the last injection, failed to reveal any cases, but 4 persons who had not received the drug were found to be diseased.

MACQUEEN (p. 697) states that it has become increasingly evident that in Nigeria treatment alone cannot control trypanosomiasis, and protective measures such as communal clearing and concentration, consider that therapeutic warfare against human trypanosomiasis is the best method in the Belgian Congo.

NASH (p. 332) distinguishes between aggressive and defensive clearings against *Glossina*. The former aim at the eradication of season sanctuaries, the latter at the protection of the populace during the course of normal work or travel by driving back the fly to a distance. LE ROUX (p. 329) considers that an essential measure is

eradication of trypanosomiasis of cattle in a district of Northern Rhodesia is that an attempt to reduce the food supply of *G morsitans* should be made, for instance by shooting buffalo

Trypanosomiasis in Animals and Experimental Work

VAN SACEGHEM (p 716) inoculated calves of less than one month old with *T congolense* passaged through guineapigs or rabbits (to eliminate infections such as piroplasma peculiar to the ox) and found that a benign infection lasting several months and ending in spontaneous cure resulted leaving real immunity. MACQUEEN (p 698) records an experiment from which it is concluded that certain cattle which had recovered from *T vivax* infection and resisted subsequent injections of *T vivax* and *T congolense* possessed a natural rather than acquired resistance. PERLA (p 350) failed to find consistent results in raising the natural resistance of mice against *T equiperdum* and *T brucei* by the administration of vitamin C prior to and throughout the course of infection.

CASTELLANI and JACOZO (p 328) report success in increasing the natural resistance of guineapigs to *T gambiense* by the use of an antigen consisting of blood rich in trypanosomes treated with small quantities of bile or defibrinated homologous blood rich in the dead bodies and products of autolysis of trypanosomes.

TARANTINO (p 700) shows that *T brucei* and *T congolense* infections of cattle are found in Abyssinia.

GUIDETTI (p 328) produced various involution forms by exposing *T brucei* from the blood of guineapigs to the action of certain dyes.

FRENCH (p 712) working on *T brucei* and *T congolense* infections in animals, found that an increased excretion of nitrogen body bases chlorides and phosphates takes place. The relative proportion of albumin in plasma decreases and that of euglobulin increases progressively to death or crisis. There is no alteration of the blood urea. Increase in the sedimentation rate of red cells was found by the same author (p 347) in cattle sheep and donkeys infected with *T congolense* and *T brucei*. It was most marked in donkeys but the rate of sedimentation of normal blood of these animals also shows differences.

In rabbits the fatty constituents of the plasma other than cholesterol are markedly increased in *T brucei* infection (TUNG and MA, p 713). PACKCHIANIAN (p 348) found that the electrical conductivity of defibrinated rat blood infected with *T brucei* was higher than that of normal blood.

HOARE (p 331) discusses the polymorphic trypanosome causing disease in African pigs and concludes that its correct name is *T simiae* Bruce et al 1912. *T simiae* has been found to occur in pigs in the forest in the Gold Coast. Great and sudden mortality is experienced. The usual infection is by *T brucei*. *T theileri* was found in large numbers in the blood of cattle (p 330). In French West Africa CURASSON (p 331) observed epidemics of *T brucei* infection of pigs. It may be benign or severe depending possibly on successive reinfections and numerous passages through the pig or on avitaminosis.

SHARROCKS (p 348) found that a serum prepared by an antigen of living *T hippicum* was antagonistic to more strains than one prepared by injecting trypanosomes killed by 0.5 per cent. phenol. The survival time in rats was in direct proportion to the amount of serum

administered. It appeared that trypanosomes resistant to one injection were not completely so to a second. There is a slight *in vitro* action of human serum on the organisms, but this is not responsible for the complete protection afforded to rats by the administration of normal human serum.

Oxo (p 713) found that the serum of rabbits immunized against turtle serum inhibited the trypanolytic action, but not the haem-agglutinating action, of sera of the turtle and other cold blooded animals. Trypanosomes failed to resist fresh cold-blooded serum but resisted inactivated serum, after long continued addition of the fresh serum to cultures.

TALLAFERRO (p 717) contrasts the action of trypanocidal antibody and ablastin (reproduction-inhibiting antibody) in *T. lewisi* infections. Passive transfer of ablastin takes place as effectively in splenectomized and blockaded rats as in normal rats, but that of trypanocidal antibody is slightly impaired. Passive immunity with ablastin lasts only a few days. In normal rats it is replaced by active ablastic immunity but in splenectomized and blockaded rats this does not occur. Passive immunity with the trypanocidal antibody lasts only a few days. Surviving trypanosomes in splenectomized and blockaded rats actively multiply owing to the failure of development of ablastic immunity. An epidemic in rats due to *T. lewisi* is described by SLATSEAST & al. (p 332). The symptoms are given.

CHAGAS DISEASE

LYOFF (p 722) shows that growth of *T. cruzi* is abundant in serum to which is added both haematin and ascorbic acid.

LIND SOEL DROEG (p 718) showed that *Trypanosoma infans* could transmit *L. icterohaemorrhagiae* and that when infected with paratyphoid organisms there was reason to believe that infection could be transmitted by *Past. pestis*. For the complement fixation reaction this author uses a dry culture antigen prepared from condensation fluid of 14 day cultures of *T. cruzi* on Bonacci's medium.

MAZZA & al. (p 718) found 33 per cent of 1722 specimens of *Trypanosoma infans* infected with *T. cruzi*. *Trypanosoma* captured in the sleeping rooms of dwellings in La Rioja. *Trypanosoma* captured in poultry yards and dove-cotes were not so heavily infected. Wood and Wood (p 719) failed to find infection in the faeces of 287 cone-nose bugs and the blood of 80 rodents in the United States.

JOHNSON (p 722) examined the cardiac changes in infected dogs. There is parenchymatous myocarditis with interstitial reaction. These may be acute or chronic and the focal lesions only occur on rupture of the cardiac fibres and liberation of the parasites, and are probably not due to toxins. Scarring and focal lesions are found in chronic cases when parasites cannot be seen. Wood (p 354) describes the cytological variations in white-footed mice infected with *T. cruzi*. Increase in large lymphocytes and decrease in eosinophil leucocytes were observed. The spleen is enlarged with hyperplasia of lymphoblasts and lymphocytes and hyperplasia of the reticulo-endothelial cells were produced. The bronchial, lumbar and inguinal glands were enlarged.

LACORTE (p 721) uses an antigen prepared from the spleen of a well-infected puppy for the Machado reaction. Positive results were obtained in 68.5 per cent. of 35 cases.

MAZZA (p 718) shows a fatality rate of 5.8 per cent. in 240 cases reported in the Argentine. In most of the dwellings occupied by patients puppies and kittens were found naturally infected by *T. cruzi*. Descriptions of cases are given by TALICE *et al* (p 352) MAZZA *et al* (pp 353-721) and LUNDEBERG (p 720). Typical lesions are recorded but in one meningo-choroiditis was present with encephalitis a condition constantly present in animals but not hitherto reported in man. Dacryoadenitis and facial oedema are emphasized. TALICE (p 351) found four cases of disease in Payandó where *T. infestans* is very prevalent.

IENSCHE (p 344) states that a substance related to Surfen and Surfen C possesses activity against *T. cruzi* which has not been affected hitherto by any chemotherapeutic agent. KOFORD *et al* (p 353) working with tissue cultures of *T. cruzi* in embryonic rat heart tested three arsenicals. Arsenious trithiosalicylic acid was the most toxic for *T. cruzi* but was toxic also to tissue *in vitro* and to mammals.

C II

CHOLERA.

PRECIS OF ABSTRACTS IN THIS SECTION

OLISCH (p. 364) describes a method of recording epidemics of cholera in Russia by means of "isodates," analogous with isobars, designating on a map places attacked by the disease at approximately the same time.

RAJA (p. 365) mentions two pilgrim events in the propagation of cholera in India in 1938. GRATTAN (p. 365) incriminates infected butter as originating an outbreak in British troops. HASSETT (p. 365) shows that a water-borne epidemic started in Swat State, far from the original focus, and was conveyed by pilgrims. Two carriers originated the outbreak in a jail reported by MAITRA *et al.* (p. 366). KUNDO and PA HOW (p. 366) recovered *V. cholera* from prawns in Burma.

NGUYEN VIEM HAI (p. 366) mentions cholera in French Indo-China. The King Institute of Preventive Medicine, Gundy (p. 366) recognizes special zones of predominance of the Inaba and Ogawa types, and reports experiments on house flies which indicate that they are not efficient as carriers.

HISHIMURA (p. 367) found that the types of *V. cholera* isolated over 15 years previously by NOSECHI still retain their specific characters.

PASIRICHA *et al.* (p. 367) isolated *V. cholera* from the stools of three of 2,000 patients (suffering from other diseases) in Calcutta. All had abdominal conditions, but not such as to suggest cholera. The characters of the vibrios are given.

The Prevention Bureau, Ministry of Health, Japan (p. 367) differentiates between the presumptive diagnosis of cholera based on morphology and a rapid result of the agglutination test on a slide, and the absolute diagnosis based on a more elaborate serum test and Pfeiffer's bacterolytic test. TAYLOR (p. 368) reiterates the opinion that, for India, *V. cholera* belongs to the special group "O" No. 1.

(Gardner and Venkatraman) is non-haemolytic and gives characteristic biochemical reactions. Vibrios of other antigenic types exist abundantly in nature and it is not therefore surprising that they are found in the intestinal contents both of normal people and patients with cholera. RUSSELL (pp. 368-369) has tested many differential serum methods. He states that monovalent antiserum "O" Inaba is specific and preferable to "O" Ogawa and Napoli. Details of the essentials in the diagnosis of the true cholera vibrio are given. Inaba "O" anti-serum prepared with lithium chloride antigen agglutinates at a higher titre than that prepared by other methods and Inaba "O" antisera are more efficient than Ogawa "O". In the study of the specific polysaccharides of *V. cholera* LIXTON *et al.* (p. 370) emphasize that only strains freshly isolated in the early part of an epidemic should be used, as these contain a lipoid-polysaccharide complex which is absent from strains isolated later in an epidemic, or maintained for a long time in the laboratory.

LAIGRET and AUBERTIN (p. 370) succeeded in reviving *V. cholera* which had been desiccated over calcium chloride for 24 hours and preserved at room temperature for five weeks. The epidemiologic importance of this observation is noted. Working on an electrophoretic reaction, LIXTON *et al.* (p. 371) conclude that a shift in surfs

potential is the cause of serological distinction of the R derivatives from their S homologues. LODENKÄMPER and KALLINICH (p 371) claim that pleomorphic spheres, later growing out into vibrios were obtained in the filtrate (through membrane) of a suspension of *V. metchnikovi*.

MERTENS *et al* (p 371) show that the El Tor vibrio is haemolytic to goat erythrocytes belongs usually to the Ogawa type serologically and is usually Voges-Proskauer positive. BAARS (p 372) studied the katabolic products formed from glucose in a special medium containing chalk. The ratio of CO₂ and fermented sugar was 0.88 for the V P positive El Tor and 0.52 for the V P negative *V. cholerae*. MARRAS (p 373) notes that the El Tor vibrio cannot be distinguished from *V. cholerae* by serological methods alone.

BERNARD *et al* (p 373) describe the technique for the extraction of the potent exohaemolysin of the El Tor vibrio from agar or bouillon. By the same technique a feeble endohaemolysin may be obtained from *V. cholerae* under certain conditions and they (p 373) consider that the same haemolysin may be common to the El Tor and the true cholera vibrio. They describe colour phenomena produced on suspensions of erythrocytes by the El Tor haemolysin. DEL FAVERO (p 374) showed that laboratory strains of *V. cholerae* subjected to 15 passages and incubated at 20°C. became strongly haemolytic to sheep erythrocytes.

DE MOOR (p 374) describes an outbreak of cholera like disease near Macassar which was not explosive and which he considers to be endemic and not imported. About 400 strains of vibrios showing the characters of the El Tor type were isolated they were distinctly haemolytic. VAN LOGHEM (p 375) examined two of these strains and confirmed that they were of the El Tor type. He suggests the name El Tor enteritis for the disease. OMAR (p 375) isolated an El Tor vibrio from the stool of a woman who had never left Egypt. She gave no history of significant intestinal disturbance.

SOLIMAN (p 375) shows that saprophytic vibrios are not serologically identical with *V. cholerae*.

TAYLOR and AHUJA (p 376) here amplify the contention that vibrios found in water may be found in the stools of cholera patients and normal people without possessing any aetiological relationship. Such vibrios (which do not agglutinate with pure O cholera serum) are almost universally found in water in North India, where cholera is not endemic. PANDIT and MAITRA (p 376) isolated 33 strains from open surface waters in Assam. PASRICHA *et al* (p 377) found that vibrios isolated from water flies and cockroaches were all inagglutinable with Inaba O serum and most belonged to Heiberg's types I and II. LAHIRI and DAS (p 377) examined 75 strains of vibrios isolated from animals. None agglutinated with Inaba O serum. They suggest that the vibrios are present in the stools as contaminants.

VARDON and DATTA ROY (p 377) describe a cheap papain-casein medium for the preparation of bacteriophage especially cholera phage. GENEVRAY and BRUNEAU (p 378) use a medium of 20 gm. peptone and 30 gm. salt to 1 000 cc. distilled water at pH 8.5 for the rapid passages of culture from cholera stools and for the elimination of contaminants such as *Ps. pyocyanea* and *Proteus vulgaris*. BANERJEE (p 378) uses Ramon's glucose bouillon for the anaerobic culture of *V. cholerae* as the pH does not change.

DEMONTE and GUPTA (p. 379) failed to isolate *V. cholerae* from the blood of 26 cholera patients, and CHATTERJEE and MALIK (p. 379) failed in attempts with urine, but *V. cholerae* was isolated from material obtained by liver puncture as well as from the stools of a boy reported by PASRICHA *et al.* (p. 379). GHOSH (p. 379) records five patients with typical symptoms of cholera from whose stools *Ps. pyocyanea* but no *V. cholerae* was isolated.

On the assumption that hypochloreaemia is one of the dangerous features of cholera MASSIAS (p. 380) injects 20 cc. of a 20 per cent. sodium chloride solution intravenously. Mortality has been lowered to 22 per cent. THOMAS and TING (p. 380) show that pyrogenic substances in the distilled water used for intravenous salines are responsible for untoward effects and advise rigid precautions (q.v.) in the distillation and preparation of the solution. BANERJEE (p. 381) avoids the rigors common after intravenous saline by regulating the temperature of the solution to as much above 36.7°C. as the rectal temperature is below this.

CHATTERJEE and DEO (p. 381) regard the A phage as that mainly concerned in cure but all available types should be used in massive doses at the earliest opportunity.

SMITH (p. 382) shows how quarantine measures have reduced the incidence of cholera in the Philippines. The discovery of the cholera vibrio in stools whether agglutinable or not, is sufficient to justify isolation and treatment. WAHBI (p. 382) notes that a quarantine station for pilgrims has been established at Rabba near the Irak frontier.

The vaccine used in the Federated Malay States (p. 382) is prepared from four strains and contains Inaba and Ogawa sub-types in equal proportions. YU (p. 383) shows that smooth strains vary in virulence and protecting capacity—strains with high animal virulence should be used for vaccines. PASRICHA *et al.* (p. 383) notes the inefficiency of certain vaccines prepared by commercial firms and the good quality of those supplied by recognized laboratories in India. CARO (p. 383) shows that 94 per cent. of 548 patients in a Haiphong epidemic had not been vaccinated and that this epidemic, in which vaccination was performed on a large scale, was extinguished, though it continued to prevail in the Tonking delta long afterwards. But QUENARDEL (p. 384) states that in Tonking reports on the efficiency of the large scale vaccination procedure were by no means all favourable.

C. H.

OLTSCHA (Reimer) with a Foreword by H. ZEISS. *Die Epidemiologie und Epidemiographie der Cholera in Russland. Ein Beitrag zur Geomedizin. [Epidemiology and Epidemiography of Cholera in Russia.]—Ztschr. f. Hyg. u. Infektionskr.* 1938. Sept. 5. Vol. 121. No. 1. pp. 1-26. With 1 fig.

Russia, in somewhat the same way as Bengal is regarded as one of the homes of cholera from which widespread epidemics may take their origin. The chief interest of the present article lies in the method of representing cholera incidence by maps, in which the separate "governments" of European Russia are variously shaded for the degree of mortality which they experienced in different cholera years and by a series of lines like isobars which are named "isodates." These lines in red, enclose territories which have been involved in cholera epidemics at approximately equal times. The more closely the isodates are set

the slower obviously has been the spread of cholera in that region. Remarks made in the introduction may be quoted — 'The errors of all previous maps are avoided by Olzscha with the introduction of the Isodates

With this method it will be possible not only to represent the course of epidemics, such as cholera plague influenza, small pox but perhaps also to probe more deeply the secrets of their progression in every country and part of the earth They may serve graphically to depict the original endemic area of an epidemic

Russia has experienced 55 cholera years since the epidemic of 1823 but only 13 of these can be regarded as major epidemics while about half are graded as evanescent It might have been expected that in those epidemics which repeated themselves in succeeding years the second-year epidemic would tend to be of less degree than the first but the reverse is frequently the case A series of cholera years 1830 1831 1847 1849 1853 1855 1870 and 1871 are dealt with seriatim in the text and shaded maps with isodate lines are given of these years in a special folding plate.

W F Harvey

RAJA (K. C. K. E.) Note épidémiologique sur le choléra dans l'Inde en 1938 [Cholera in India in 1938.]—*Bull. Office Internat. d'Hyg. Publique* 1938. Nov. Vol. 30 No. 11 pp. 2552-2561

The period of cholera prevalence covered is not the whole year but only that up to the end of August. Figures are given for the several provinces of India which admit of direct comparison of incidence and mortality. Two pilgrim events are selected for special mention in connexion with the propagation of cholera from well defined centres. These were the Kumbh Mela of Hardwar and Bndraban.

W F H

GRATTAN (H. W.) An Outbreak of Twenty-Eight Cases of Cholera among British Troops in Benares during September-October, 1912. —*Jl. Roy. Army Med. Corps* 1939 Jan. Vol. 72 No. 1 pp. 21-25

The author describes an epidemic of cholera among British troops which occurred many years ago. His verdict was that the infection had originated in contaminated butter.

W F H

HASSETT (C. J.) A Cholera Epidemic in Swat State, N.W.F., 1937 — *Indian Med. Gaz.* 1938. Oct. Vol. 73 No. 10 pp. 602-605. With 1 map & 1 graph.

The Swat State of the Malakand Agency in the North West Frontier Province of India is not an endemic focus of cholera which when it does occur is always imported from outside. The present epidemic started suddenly. It was obviously water-borne and, with some difficulty the human element by which the water had been infected was traced. It proved to be a party of Hindu pilgrims. The importance of the outbreak from the public health point of view lies in that the disease must have been carried a long distance before making itself apparent in an explosive outbreak.

W F H

BAWERJEE (D. N.) Epidémiologie du choléra dans l'Inde [Epidemiology of Cholera in India.]—*Mouvement Sanitaire* 1938. Oct. Vol. 15 No. 174 pp. 473-478

MAITRA (G. C.) SEN GUPTA (P. N.) & THANT (U) *Cholera Epidemics in Burma and the Type of Vibrio associated with them.*—*Indian Med Gaz.* 1938. July Vol. 73 No. 7 pp. 406-408. [10 refs.]

The interesting point recorded in this article is of three cases of cholera occurring in a jail set apart for habitual offenders, having no association with outsiders. A search was instituted and all prisoners employed in the jail kitchen and all contacts with actual cases came under examination. Two carriers of true cholera vibrios were in this way discovered and they were isolated until bacteriological reports declared them to be free of infective cholera organisms. *W F H*

KUMDU (K. P.) & PA HOW (U) *Prawns as a Possible Vector of V. cholerae.*—*Indian Med Gaz.* 1938. Oct. Vol. 73. No. 10. pp. 603-606.

Prawns caught in the delta districts of Burma are brought to Rangoon for sale. Various consignments were examined and two prawns yielded typical cholera vibrios the agglutination and cultural reactions of which would have led to the diagnosis of cholera had they been isolated from the excreta of a suspected case of cholera. *W F H*

NGUYEN VIEK HAI. *Rapport sur l'épidémie de choléra de 1937 dans la province de Kien-An.* [The Epidemic of Cholera in Kien-An in 1937].—*Rev Méd Française d'Extrême-Orient* 1938. Apr Vol. 17 No. 4 pp. 428-432.

A complete account is given of the ravages of cholera in a special northern province of French Indo-China during 1937 the details of which are of official interest. *W F H*

GUINDY. *REPORT OF THE KING INSTITUTE OF PREVENTIVE MEDICINE FOR YEAR ENDING 30TH SEPTEMBER 1937* [SHORTT (H. E.) Director]. pp. 23-28.—*Cholera Enquiry*

Some suggestion has been made that the Ogawa strain of the cholera vibrio might only be a laboratory phase of culture and not a vibrio occurring in nature. This possibility seems to have been definitely negatived, as "several hundred Ogawa strains have been met with in the course of investigation." A topographical distribution of the two main cholera types, Inaba and Ogawa, has been met with sufficiently distinct apparently to justify recognition of special zones or areas of predominance. No difference in the severity of Inaba or Ogawa epidemics could be demonstrated.

A special research into the rôle of the common house-fly in the spread of cholera showed that ingested vibrios are either rapidly excreted or are destroyed in the gut of the fly. Further experiments were designed to test the vibriocidal action of extracts of the crop and intestine with the result that "while the control plates showed growth of cholera the plates inoculated with a mixture of cholera suspension and the extract after one hour's contact remained sterile."

W F H

NISHIMURA (Haruo) On the Types of Cholera of Shanghai Epidemic of 1937—Reprinted from *Jl Shanghai Sci Inst* 1938. July Section 4 Vol 3 pp 251-263

The 16 strains of cholera isolated in the Shanghai epidemic of 1937 were compared with standard type strains Inaba (original type) Hikojima (middle type) and Ogawa (variant type) Although it is over 15 years since these types were isolated by NOBECU they still retain their specific character All the 16 strains now tested proved to be of the original Inaba type W F H

PARRICHA (C L.) LAITRI (M N) & DAS (P C) The Isolation of *Vibrio cholerae* from Non-Cholera Individuals.—*Indian Med Ga.* 1938 Nov Vol 73 No 11 pp 669-670

It is now very generally maintained that the 'true' cholera vibrio must be agglutinated by a pure O serum and that agglutination by an H+O serum is not specific. Examination for vibrios has been made in the Carmichael Hospital Calcutta during the past five years of stools of 2 000 patients suffering from diseases other than cholera with varying results. Recently the investigation has become more specific with appropriate sera. The examination of the stools for vibrios was carried out after a two-stage enhancement in peptone water and isolation on Aronson's medium. The 1 *cholerae* was isolated from three individuals—(1) with ill-defined abdominal symptoms for 2½ months before admission (2) with chronic diarrhoea on admission and (3) with a history of dysentery 6 months prior to admission. The vibrios isolated were monoflagellate of Heiberg's group I agglutinable to full titre with cholera (Inaba) O and H+O serums, inagglutinable with pure Ogawa serum, non-haemolytic to goat erythrocytes not phage-contaminated and they were acted on by the different types of cholera phage. W F H

JOURNAL OF THE PUBLIC HEALTH ASSOCIATION OF JAPAN 1938 Sept. Vol 14 No 9 pp 1-6—Guide for the Identification of Cholera Vibrios in Stools. By the Prevention Bureau Ministry of Health and Social Affairs.

Clear instructions are given in this guide to the identification of cholera vibrios which should be very useful to all laboratory workers faced with the necessity of furnishing a verdict on the early cases of a possible cholera epidemic. The headings indicate the general course of the procedure—collection and handling of the materials microscopic examination of smears cultures and immunological tests. Diagnosis is divided into the two headings of (a) presumptive and (b) absolute. The presumptive judgment of cholera is accorded when the morphological structure and motility of the bacteria correspond to those of cholera vibrios and a distinct positive result is observed within 2 or 3 minutes in the agglutination test on a glass slide. An absolute judgment is dependent on a more elaborate serum test with agglutination to titre and inclusion of Pfeiffer's bacteriolytic test. The Pfeiffer reaction is very often omitted W F H

altered with further subculture and thus phenol agar is not suitable for the isolation and preservation of O somatic antigen. (5) The non-specific ciliary H antigen is eliminated by the addition in suitable proportion of 96 per cent alcohol to a cholera suspension and alcohol agar can also inhibit the culture. (6) Inaba O antiserum prepared with lithium chloride antigen has been shown capable of agglutinating at 1-6000 this is a higher titre than is given by a somatic serum obtained with O antigen heated for two hours at 100°C or with phenol or with alcohol antigens which give agglutinations of 1-3000 1-2000 and 1-1000 respectively. (7) Inaba O antisera of all these antigens have higher titres than Ogawa O antisera and Napoli O antisera. (8) The anti-O serum produced with lithium somatic Inaba O antigen should help to bring about concordant results in different laboratories in the essential diagnosis of the typical cholera vibrio.

LINTON (Richard W.) SHRIVASTAVA (D. L.) SEAL (S. C.) & MOOKERJI (S. P.) Studies on the Specific Polysaccharides of the Vibrios. Part II. Chemistry and Serology.—*Indian J. Med. Res.* 1938, July Vol 26 No 1 pp 41-54 [10 refs.]

The authors continue their studies on the chemical architecture of the vibrios of their six groups by endeavouring to correlate specific precipitin serological reactions with polysaccharide composition. It had already been shown that such polysaccharides could be used in precipitin test to distinguish easily between El Tor vibrios and vibrios isolated from cholera cases. The present work is in continuation of that finding. The antisera used were obtained by injection of 18-hour agar cultures intravenously in rabbits, for it had not been found possible to obtain antisera to the polysaccharides themselves. In the present chemical and serological research previous findings were confirmed that cholera strains are quite distinct from strains from other sources. Particular emphasis is laid on the discovery of two types of cholera strains, one which is the freshly isolated strain of the early part of an epidemic and the other the strain of the later part of an epidemic. The fresh strain contained a lipod-polysaccharide complex which was absent in the second type and also absent in strains maintained for a long time in the laboratory and in water and carrier strains. It would appear desirable therefore that only freshly isolated strains should be used "in studies of antigenic structure".

W. F. H.

LAURET (J.) & AUBERTIN (Alme P.) Sur la reviviscence du vibron cholérique après sa desiccation et sa conservation à l'état frais. [Revival of the Cholera Vibrio after Desiccation and its Preservation in Nature].—*Bull. Acad. Méd.* 1938, July 5, 102nd Year 3rd Ser. Vol 120 No 28 pp 50-54.

Desiccation has usually been considered fatal to cholera vibrios, which were classified in this respect as very fragile organisms. The present experiments have shown that it is possible to revive the cholera vibrio even after it has been dried for 5 weeks. The technique of drying is to centrifuge down a cholera suspension, mix the deposit with equal parts of a mixture disodium phosphate 10 parts and monopotassium phosphate 1 part. desiccate this mixture over chloride of calcium for not more than 24 hours and preserve at room temperature. In restoring the vibrio to life from its presumably dormant condition the first

culture set up must be in bouillon. Desiccation for longer than 24 hours or by other methods such as over sulphuric acid kills the vibrios. They remain during their period of preservation strictly aerobic.

The author speculates on the importance of this finding in its epidemiological aspect. Is it possible that in nature cholera vibrios may become dried and serve at a later time as the cause of a new outbreak or again is it possible that dry vibrios may be transported as dust and give rise to infection at a distance? W F H

LINTON (R. W.), MITRA (B. N.) & SEAL (S. C.) *Electrophoresis and Metabolism of Some Vibrio Strains in Relation to Variability and Chemical Classification.*—*Indian J Med Res* 1938 Oct Vol 26 No 2 pp 329-334

Much work has been done by Linton and his collaborators on the chemical structure and metabolism of cholera vibrios by which they have been separated into a number of groups. To the methods previously adopted they now add an electrophoretic reaction combining it with the other features for the determination of possible differences between S and R vibrio homologues. It is the surface electric charge of the organisms which is studied by subjecting them to electrophoresis. The conclusion is reached that — The serological changes brought about by treatment with antiserum or by other processes follow changes in chemical structure, metabolism and surface potential. A shift in the latter is the cause of serological distinction of the R-derivatives from their S-homologues and partly accounts for the uniformity of serological behaviour of the rough vibrio strains in general. W F H

LODENKÄMPER (H.) & KALLINICH (W.) *Entwicklungstudien an Vibrionen. I Mitteilung [Developmental Cycle in Vibrios.]*—*Zent f Bakt I Abt Orig* 1938 Oct. 17 Vol. 142, No 7/8. pp 376-388 With 4 figs. [11 refs.]

This communication raises once more a subject which has been for some time in abeyance, that of the existence of a cycle of development in bacteria. The organism chosen for the purpose of experimentation in the production of bacterial polymorphism was *Vibrio metchnikovii*. A filtrate of this organism through a Berkefeld candle gave no indication of the presence of filtrable forms but membrane filtration furnished a product which showed after remaining clear for 3 weeks some pleomorphic spheres. These spheres could be made to grow out into vibrios on nutrient agar. W F H

MERTENS (W. K.), MOCHTAR (A.), BAARS (J. K.) *Vergelykend onderzoek van *V. cholerae* en *V. El Tor* Mededeeling I [I. Comparison of *V. cholerae* and *V. El Tor*]* [MERTENS & MOCHTAR]—*Geneesk Tijdschr v Nederl Indië* 1938 Oct. 25 Vol. 78, No 43 pp 2642-2664 [Refs. in footnotes.] Mededeeling II *De reactie van Voges-Proskauer in de cholera-diagnostiek. [II Voges-Proskauer Test in Cholera Diagnosis.]* [MOCHTAR & BAARS]—*Ibid* pp 2665-2671 [10 refs.] English summary

[So many laboratories now preserve their own and the type strains of *V. cholerae* and *V. El Tor* that it is possible to obtain large numbers

of these for comparative purposes. The history of the cholera-El Tor controversy is well known. It is however of the utmost importance to distinguish between these two main types as decisions at frontier and other quarantine stations turn on the diagnosis made. The bacteriological procedure for making the decision is already almost stereotyped]. A summary of the conclusions arrived at by the authors may be given —

I (1) Cholera and El Tor strains belong to HERSKOV's type I. They form acid in glucose mannite maltose, saccharose and mannose but not in arabinose. (2) El Tor vibrios haemolyse goat erythrocytes in bouillon in 24 hours and develop a rose halo around their colonies on blood agar while cholera is non-haemolytic. (3) Cholera strains belong serologically to either the IKEDA or the OGAWA type. El Tor strains belong to the OGAWA type and only a few to the IKEDA type.

II All of the 178 strains of vibrios studied possessed certain common characters — (a) production of acid in glucose mannitol maltose, dextrose and mannose no acid in lactose and arabinose positive indole and cholera-red reactions (b) agreement with the "O" sub-group of GARDNER and VEKKATRAMAN

Out of the 178 strains 105 were non-haemolytic and are to be regarded as true cholera strains. They were all, except two, Voges-Proskauer negative. Seventy-one strains, being haemolytic, are of El Tor type and of these 62 were Voges-Proskauer positive and the remaining 9 negative.

II F H

BAARS (J. H.) Glucose-dissimilation door *Vibrio cholerae* en *Vibrio El Tor*. [Dissimilation of Glucose by *V. cholerae* and *V. El Tor*] — *Antonie van Leeuwenhoek Nederl. Tijdschr. v. Hyg. Microbiol. en Serol.* 1938. Vol. 5. No. 1. pp. 43-63. (Refs. in footnotes.) English summary. Also in *Geneesk. Tijdschr. v. Nederl. Indis* 1938. Nov. 15. Vol. 78. No. 48. pp. 2881-2890.

It is generally contended that cholera vibrios ferment glucose without production of gas and it has been shown that the formation of acid from carbohydrates is such that a culture is rendered sterile in 2 to 3 days. This last finding suggested that a research into the catabolic products formed from glucose necessitated the development of culture conditions which should, at least, be as favourable as possible to continued vibrio growth. The first medium used had the composition — glucose 5, difco peptone 5, di-pot. phosphate 5, sod. chloride 5, tap water 1,000 with pH 7.4. In the matter of continued growth and activity improvement was obtained by adding chalk to the medium to neutralize the acid formed and increasing the amount of glucose present. The medium now had the composition — glucose 20, difco peptone 5, sod. chloride 5, calc. carbonate 15, distilled water 1,000 with pH 7.2. In this medium, which was daily shaken and incubated at 27.5°C. abundant gas developed. The purity of the culture was checked at the end of the test. Analysis of the products of growth showed that both *V. cholerae* and *V. El Tor* gave as products — carbon dioxide, formic acid, acetic acid, lactic acid, succinic acid and ethyl alcohol. As one of the distinguishing characters of the two vibrios is that the cholera vibrio is Voges-Proskauer negative while the El Tor vibrio is V.P. positive, it was natural that the latter should be found to produce acetyl-methyl-carbinol with sometimes, traces of 2-3 butylene glycol or diacetyl. "The ratio of produced carbon dioxide

and fermented sugar was found to be for the V.P. positive *El Tor* strains 0 88 and for the V.P. negative *cholerae* strains 0 52.

W F H

MARRAS (F Maria) L'agglutination nell' identificazione del vibrione del colera non è specifica ed in molti casi non ha valore. [Agglutination not Specific in the Identification of the Cholera Vibrio]—*Ann d'Igiene* 1938 Nov Vol. 48. No 11 pp 649-663

Five vibrios isolated at El Tor during the pilgrimage of 1936 were from individuals without any sign of cholera. They produced indole were strongly haemolytic to sheep erythrocytes and agglutinated at dilution of 1 1000 with testing cholera sera for both O and O+H antigens. Similar results were obtained by absorption and cross agglutination tests. Again the same result was obtained with 27 vibrios isolated at El Tor during 1937 and with vibrios isolated in 1938. The conclusion is drawn that the cholera vibrio cannot be differentiated serologically from the vibrio El Tor

W F H

BERNARD (P Noël) GUILLERM (J) & GALLUT (J) Extraction de l'hémolysine du vibron d'El Tor. [Extraction of El Tor Haemolysin.]—*C R Soc Biol* 1939 Vol. 130 No 1 pp 23-24

It had been shown that it was possible to extract a haemodigestive ferment from the agar on which the cholera vibrio had been grown for 3 days [this *Bulletin* 1938 Vol. 35 p 308]. In the same way the El Tor vibrio impregnates the substance of the nutrient agar with its characteristic haemolysin which can be extracted. The method of extraction is to soak the agar in 0.9 per cent toluene-covered saline water of pH 8.2. This fluid is freed from particulate matter and residual organisms by frequent centrifuging but must on no account be filtered through a filter candle. It is saturated with ammonium sulphate and still the pH 8.2 must be preserved. A similar technique is employed to obtain haemolysin from a bouillon culture and the product may be 200 times more haemolytic than the original bouillon culture. It is not possible to extract by this technique a haemolysin from the cholera vibrio culture even when the organism exhibits a temporary haemolytic power on first isolation. If a suspension of cholera vibrios however is kept for 5 days at incubation temperature or a bouillon culture for 9 days it becomes possible then to extract a feeble haemolysin. The two substances thus extracted from El Tor and cholera vibrios respectively correspond, evidently from the conditions for their production to exohaemolysin and endohaemolysin

W F H

BERNARD (P Noël) GUILLERM (J) & GALLUT (J) Sur quelques caractères des hémolysines des vibriens cholériques. [Haemolysins of Cholera Vibrios.]—*C R Soc Biol* 1939 Vol. 130 No 3 pp 228-230

The hypothesis is presented here that one and the same haemolysin is common to the El Tor and the true cholera vibrios. In the former it is free and in the latter it is combined with a neutralizing substance. Would not, then, a certain variability in the amount of the two constituents of the complex suffice to explain what are certainly anomalous features of the cholera vibrio haemolysin?

W F H

[May 1939]

BERNARD (P Noël) GUILLEMIN (J) & GALLUT (J) L'hémolyse par le vibron d'El Tor et par son hémolytine. [Haemolysis by the El Tor Vibrio and by its Haemolysin.]—*C R Soc Biol* 1939 Vol 130 No 2 PP 147-148.

The haemolysin of the El Tor vibrio obtained by extraction (see above) produces a limpid red ruby colouration in the suspension of erythrocytes on which it acts, whereas the addition of a suspension of living vibrios from an agar culture brings about after some minutes at 37°C a violet turbidity. It seems probable that the violet colouration of the erythrocytes is a phenomenon of reduction. It does not occur if the vibrios are killed. This same violet tinting of a suspension of erythrocytes is also caused by glutathion or even yellow of egg. It disappears when haemolysis occurs.

W F H

DEL FAVERO (E) Influenza del fattore termico sul vibrione colerigeno e sue proprietà di fronte alla emolisi [Effect of Heat on the Cholera Vibrio and its Haemolytic Power]—*Arch. Ital. Sci. Med. Colon. e Perissit* 1938. July Vol. 19 No 7 pp. 430-431

Laboratory strains of the cholera vibrio which were agglutinable to high serum-titre and were non-haemolytic have been subjected to 15 passages and incubation at 20°C. There was no appreciable alteration in their agglutinability but the vibrios became strongly haemolytic in sheep erythrocytes, which were also agglutinated.

W F H

DE MOON (C E) Un vibron du type El Tor responsable dans la partie sud de l'île de Célèbes (Indes Néerlandaises) d'une épidémie présentant les apparences complètes du choléra. [An El Tor Vibrio as Cause of a Cholera Epidemic in Celebes.]—*Bull. Office Internat. d'Hyg. Publique* 1938 July Vol 30 No 7 pp 1510-1519

A description is given here of an epidemic of cholera or cholera-like disease in villages near Macassar the capital of the island of Celebes. The importance of the occurrence rests on whether the vibrio isolated can be truly designated as an El Tor type. Cases varied in their gravity from a cholera *sufferens* type where death supervened in a few hours to a cholerae or choleraic diarrhoea and even symptomless type. Rice water stools dehydration and development of oligæmia sicca. The outbreak occurred as one or two cases a day often at several days interval, without explosive development. The first epidemic of 1837 was not accompanied by bacillary dysentery but that of 1838, which raged during the rainy season, was accompanied by a serious epidemic of Shiga confirmed the cholera like characters morphological, biochemical and serological. The agglutination tests applied were those of the non-specific H agglutinin and that of the specific O agglutinin (Inaba and Ogawa type). These were positive as also was the Pfeif test. Haemolytic activity was shown for goat erythrocytes. About 400 strains were examined and they were all practically identical in particular they were distinctly haemolytic.

The author considers the disease here in question is endemic and not an accidental importation. Further examination of the vibrios and commentary on their position is provided by Professor van Loghem.

II F H

VAN LOGHEM (J J) Un vibrión El Tor pathogène isolé aux Indes Néerlandaises [A Pathogenic "El Tor" Vibrio from the Netherlands Indies].—*Bull Office Internat d'Hyg Publique* 1933 July Vol. 30 No 7 pp 1520-1523

Two of the vibrio strains 757 and 794 isolated by Dr de Moor in the Macassar epidemic described by him were sent to Professor van Loghem at Amsterdam for examination. This examination confirmed the diagnosis already made of a pathogenic El Tor vibrio in all respects. The most important characters of the vibrio were —(1) It gave the reactions of Heiberg's group I (2) The modified Voges-Proskauer reaction was positive (3) Marked haemolysis occurred in goat blood bouillon in 24 hours (4) Positive agglutination was manifested with anticholera serums HO and O (Gardner group I) and there was no loss of agglutinability of suspensions heated for 3 hours at 56-57°C. (5) Marked toxicity was shown for the white rat of 5-day bouillon cultures killed with phenol or as Seitz filtrates. These are the characters of an El Tor vibrio. Van Loghem as a result of his examination, says — On the assumption that the vibrio of Koch and the vibrio El Tor represent two different bacterial species I conclude that the Celebes outbreak is not identical with true cholera. With this dualistic view as basis I propose to distinguish the diseases caused by the two vibrios and to name that caused by the El Tor vibrio *enteritis cholerae formis* or more simply El Tor enteritis.

II F H

OMAR (Wasfy) Vibrio El-Tor Isolated from the Stools of an Egyptian who has never been to Hedjaz.—*Jl Egyptian Med Assoc* 1933 July Vol. 21 No 7 pp 415-428

At the Tor camp laboratory during the years 1930-1933 the number of stool examinations of returning pilgrims was 61,339 with isolation of 583 vibrios of which 77 were agglutinable El Tor vibrios. It is to be noted however that during the first 6 years only an HO serum was used whereas latterly a standard O serum has been used. The presumption is that the pilgrims pick up an El Tor vibrio while on pilgrimage and this seems to be substantiated by the examination of 1,532 Egyptians some years ago before they started no El Tor vibrios were discovered. Now the author has made examination of 1199 specimens of stools during the off-pilgrimage season. He has isolated 16 vibrios of which one was of El Tor type agglutinable with the H+O and O standard sera. The carrier of this vibrio is a woman who has never left Egypt. Although she suffers from cystitis she is in good general health and gives no history of any present or remote signs of any significant intestinal disturbance. The medium which has been found most satisfactory for isolation of vibrios is the glyco-coll haemoglobin medium of Vedder and Van Dam.

IV F H

SOLIMAN (Nasr) A Serological Classification of 28 Vibrios.—*Jl Egyptian Med Assoc* 1933. Sept Vol. 21 No 9 pp 603-605.

Thirteen saprophytic vibrio strains isolated at El Tor have been compared serologically with standard cholera vibrios. These

saprophytic vibrios are found to be heterogeneous among themselves and, although they share H agglutininogen with the cholera vibrio are not serologically identical with it.

W F H

TAYLOR (J) & ARUJA (M. L.) Incidence and Characters of Vibrios in Waters in Northern India. —*Indian J Med Res.* 1938. July Vol 26 No. 1 pp 1-32. [12 refs] [Summary appears also in *Bulletin of Hygiene*]

The examination of water supplies for the type of vibrio present has a special bearing on the occurrence of vibrios in cholera stools other than typical *V. cholerae*. The authors practically insist that the typical *V. cholerae* is the vibrio which agglutinates with pure "O" serum of O group I (Gardner and Venkatraman). On the other hand "H" antigen may be possessed by many vibrios in common with *V. cholerae* so that agglutinability with Inaba "HO" serum may be due to this antigen and indicates that an "HO" serum is not satisfactory for the detection of the cholera vibrio. The investigation here reported was conducted to discover which were the vibrios found in water in parts of India not at the time visited by cholera. It takes into account like wise the cholera season by dividing the investigation into two parts: (1) Observations during the hot-weather and monsoon periods, and (2) Observations during the cold weather period. All types of vibrio of the Heiberg six groups were found although in very varying numbers. During the hot weather or monsoon the majority of the types belonged to Heiberg's groups I and II while in the cold weather vibrios from the same area belonged mainly to groups V and VI. Vibrios it has been found are almost universally present in unprotected wells, tanks and rivers in areas of Northern India where cholera is not endemic and their presence is in no way related to contamination from cholera sources. No isolated strain was agglutinable with pure "O" cholera serum, although "many of the strains showed O serological relationship with vibrios other than typical *V. cholerae* isolated from cases of clinical cholera and from carriers in Bengal and other parts of India." All these findings lead up to the deduction that vibrios other than typical *V. cholerae* isolated from cholera stools are probably water vibrios. "It is obvious say the authors, that with this almost universal distribution of vibrios in water including waters which may be used for drinking purposes, vibrios must frequently obtain entrance to the intestinal tract of those using the water and the appearance of such vibrios in stools of healthy individuals or in cholera cases is to be expected."

W F H

PANDIT (S R) & MAITRA (N M) Vibrios in Natural Water Sources in Assam. —*Indian J Med Res.* 1938. July Vol 26 No 1 pp 39-40

This short communication has reference to the vibrios isolated from open surface waters in Assam. The method used for isolation differed somewhat from other similar essays in that cultivation was carried out at a pH close upon 9.0. It was found that 33 strains isolated were monotrichate and 17 leptotrichate. A point worth noting is that *Bacillus faecalis alkaligenes* although giving the same fermentation reactions as the vibrios did not reduce nitrates or liquefy gelatin, and produced

alkalinity in milk. No material difference was noted in the incidence of vibrios or in their characters during the cold weather as compared with the hot weather period. *W F H*

PASRICHA (C L.) CHATTERJEE (D N.) & DAS (P C.) The Distribution and Characteristics of Vibrios Isolated from Certain Non-Human Sources in Calcutta.—*Indian Jl Med Res* 1938 July Vol 26 No 1 pp 33-37

This study deals with surface waters, tubed water supplies, flies and cockroaches as non human sources of vibrios. It takes its importance from a well attested fact that although the O inagglutinable vibrios are found in sewage or in polluted waters similar vibrios are occasionally found in the stools of cholera patients, carriers or contacts and their presence sometimes causes confusion in making a bacteriological diagnosis. From this finding arises the question whether such inagglutinable vibrios may not be choleric. By inagglutinability is meant non-agglutinability with pure O serum of the type group I of Gardner and Venkatraman for naturally they do agglutinate with O serum produced by their own O type of antigen. The summary of the authors' findings from an investigation of 300 samples of surface waters, 320 flies and 94 cockroaches is comprised in the statements that (1) The vibrios isolated from different samples of water from flies and cockroaches were all inagglutinable with Inaba O serum and (2) Biochemically the majority of the strains of vibrios isolated belonged to Heiberg's types I and II and very few to the other types. *W F H*

LAHIRI (M N.) & DAS (P C.) Vibrios from Certain Non-Human Sources.—*Indian Med Ga.* 1938 Nov Vol 73 No 11 pp 670-671

These non human sources were a variety of animals. The results of the examination of single specimens show that except for mules, mice and cats vibrios are found in the stools of the majority of the animals. From the number of positive isolations and the percentages which are given it is possible to calculate the number of animals of each species dealt with. A total of 195 animals of 13 different species was examined. Seventy five strains were examined in detail—all were inagglutinable with O Inaba serum, 33 were agglutinable to full titre with H + O serum, grouped according to Heiberg, 41 were of group I, 32 of group II and one each of groups III and VI. Indole production was positive in 54 and 16 were haemolytic to sheep erythrocytes. Bacteriophages active against the vibrios isolated from the animals were not found in a series of fifty stools. This with the irregular isolation of vibrios from the stools of laboratory animals suggests that vibrios are present in the stools of animals as contaminants. *W F H*

VARDON (A C.) & DATTA ROY (B K.) A Papain-Caseln Culture Medium for the Preparation of Bacteriophage and for General Laboratory Use.—*Indian Jl Med Res* 1938 Oct. Vol. 26 No 2 pp 379-392. [Summary appears also in *Bulletin of Hygiene*.]

Experiments were undertaken by the authors to find a cheap, unobjectionable, and satisfactory nutrient medium for general laboratory

use and for preparation of therapeutic bacteriophage. The papain mutton routine medium was not altogether satisfactory for the purpose. They have prepared a papain-casein medium which answers all requirements. It is a medium in which the nitrogen content is represented mainly by proteose and peptone. Full details are given of the technique of preparation. The relative cost of Witte's peptone medium, papain-mutton broth and papain-casein broth is given as 39 13.5 4.6 respectively and the new medium is described as suitable for the growth of ordinary bacteria, delicate bacteria and bacteriophage. Much of the work was done with *V. cholerae* and cholera-dysentery bacteriophage but *Bact. coli*, *Bact. typhosum*, *Bact. paratyphosum A* and *B. streptococci*, pneumococci and *N. gonorrhoeae* were also used.

W F H

GENEVRAY (J.) & BRUXEAU (J.) Utilisation de l'eau peptonée hypersalée comme milieu d'isolement du vibron cholérique [Hypersalted Peptone Water as Cholera Isolation Medium].—C. R. Soc. Biol. 1933, Vol. 129, No. 25, pp. 163-167.

It had been found that rapid and successive passages of culture from cholera stools were successful in the isolation of *V. cholerae*. Some disadvantages attached to the method because of the overgrowth of organisms like *Ps. pyocyaneus* and *Proteus vulgaris* especially when the stool sample arrived late in the day and the first culture obtained could not be dealt with till next morning. As an excess of salt such as 30-40 parts per 1,000 of peptone water did not inhibit the growth of the cholera vibrio the method now adopted—and with success—is to make up the peptone water with 20 gm. peptone and 30 gm. salt to the 1,000 cc. distilled water and adjust to pH 8.5. Ordinarily the procedure adopted is after sowing and an incubation of 8 hours at 37°C. to make a fresh sowing of one loop from the surface to nutrient agar and another to a tube of hypersalted peptone water. The next morning the agar tube is examined and fresh sowing made from an isolated colony. It may sometimes be necessary to sow again from the second peptone water tube to agar.

W F H

BANERJEE (D. N.) Culture du vibron cholérique anaérobie les variations de son pH et son pouvoir toxique. [Anaerobic Culture of the Cholera Vibrio].—C. R. Soc. Biol. 1939, Vol. 130, No. 1, pp. 32-34.

It was found that the cholera vibrio grew luxuriantly under anaerobic conditions in glucose media. Changes in pH of the medium are well known and these occur for both aerobic and anaerobic cultures whether ordinary or glucose media. In RAMON'S glucose medium, however the pH does not change whatever the oxygen conditions and therefore this medium, with the addition of glucose is the one to be preferred.

W F H

[No reference to RAMON'S medium is given in this paper but the following (RAMON, G. C. R. Soc. Biol., 1933, Vol. 112, p. 8) is probably the medium used—10 cc. HCl and 225 gm. fresh hog's stomach are digested at 45°C. for 2 hours. To this is then added 325 gm. veal finely minced, and the whole is well mixed. After 20-22 hours digestion is stopped by heating to 80-100°C., and the mixture is strained. The liquid is brought to pH 8 by means of soda lye and subsequently heated to 100°C. for 20 minutes, filtered and autoclaved. Glucose (1.5 to 2 gm. per litre) and sodium acetate (5 to 10 gm. per litre) are added after sterilisation.]

DEMONTE (A J H) & GUPTA (S K) Blood Culture in Cholera.—
Indian Med Ga 1938 Nov Vol 73 No 11 p 670

Blood cultures were made on 26 cholera patients and in 20 of these within 9 hours of the onset of symptoms. In no case was the cholera vibrio isolated. W F H

PASRICHA (C L) DEMONTE (A J H) & CHATTERJEE (B C) Vibrio cholerae from Material obtained by Liver Puncture during Life.—
Indian Med Ga 1938 July Vol 73 No 7 pp 405-406

In life cholera vibrios are capable of isolation from stools vomit or urine but no record exists of recovery from the liver. This has been done by the authors. A boy of 7 years developed cholera and on the third day complained of pain on the right side of the abdomen. An icteroid tinge was present in the conjunctivae which deepened into jaundice. By the seventh day he had become worse and liver dulness extended to below the umbilicus. Liver puncture was done and the few drops of blood obtained were inoculated into peptone water. The patient improved after the puncture and was well in about 14 days. Typical O-agglutinable smooth cholera vibrios had been isolated from the stools but not from the blood or urine. The liver puncture material gave a positive culture and again O-agglutinable cholera vibrios were obtained with all the same characteristics biochemical serological and bacteriophagic as vibrios obtained from the stools. W F H

CHATTERJEE (D N) & MALIK (K S) The Bacteriological Examination and the Hydrogen-Ion Concentration of the Urine of a Series of 122 Cholera Patients.—*Indian Med Ga* 1938 Oct Vol 73 No. 10 pp 612-613

No cholera vibrios were isolated from the urine of patients. The urine of 50 bacteriologically-proven cholera patients was found to be of pH 4.4 to 5.4 during the acute stage of the disease and to become normal with the subsidence of acute symptoms. W F H

CHATTERJEE (B C) Cholera its Diagnosis and Treatment.—*Calcutta Med Jl* 1938 Dec Vol 34 No 6 pp 508-528

OTSUO (G) Réaction d'agglutination des sérums immunisés par l'antigène O de vibron cholérique, au point de vue du diagnostic [Immune Sera from Antigen O in the Diagnosis of Cholera].—*Bull Office Internat d'Hyg Publique* 1938 July Vol 30 No 7 pp 1506-1509

GHOSH (H.) *B. pyocyaneus* Infection simulating Cholera and Acute Dysentery.—*Jl Indian Med Assoc* 1938 Sept. Vol 7 No 12 pp 655-656

Several patients were admitted to hospital with typical symptoms of cholera and blood in the stools. In the cultures of the stools made from 7 patients *Ps. pyocyanea* was found in five and no cholera vibrios

The organism too was highly virulent for the rabbit in a dose of 0.25 cc. of 22-hour broth culture. The author recollects a number of cases in the past with dysenteric symptoms in which *Ps. pyocyaneus* was isolated.

W F H

MASSIAS (Charles) A propos du traitement du choléra. Les injections intraveineuses de solution chlorurée hypertonique à 20%. [Intravenous Injection of 20 Per Cent. Hypertonic Saline in Cholera.]—*Rev Méd Française d'Extrême-Orient* 1933. Feb. Vol 16. No 2. pp 131-134 [26 refs.]

Many of the grave features of cholera are due to hypochloraemia. Chloropenia, in fact, is a more important symptom than dehydration. With this foundation to go on the author has made a practice of injecting as a matter of urgency 20 per cent sodium chloride intravenously in cholera. The dose has been 20 cc. and is repeated 12 hours later if necessary. In this way the loss of salt, which has taken place through vomiting and diarrhoea, is restored and so is diuresis. Mortality has been lowered to 22 per cent. It is possible that a 10 per cent. solution of salt may be a better concentration than 20 per cent. and, certainly a 30 per cent. concentration is harmful by producing tachypnoea and arterial hypertension.

W F H

THOMAS (Harold) & TENG (Lih-cheng) Innocuous Intravenous Infusion with an Appeal for the Establishment of Central Solution Laboratories for Cholera Relief.—*Chinese Med J.* 1933. Oct. Vol 54 No 4 pp. 358-368. With 1 fig [13 refs.]

Although dramatic results follow the administration intravenously of saline solution to cholera patients and to dehydrated patients suffering from dysentery and typhoid these are apt to be temporary and to be followed by dangerous symptoms. In fact the mortality among those receiving a saline injection might be higher than among those who do not. Experimental work has shown that these symptoms are due to pyrogenic substances in the distilled water used. The distilled water must be pure and must be maintained pure and ready for use. Four principles are to be followed in distillation — (a) Discard the first run of the distillate for a period of 15 minutes. (b) Distill slowly to avoid foaming. (c) Deconcentrate rapidly. (d) Cleanse still every six months." Other instructions are that no delay must occur over sterilization of the distillate which should be collected directly into glass- or enamel-ware containers. Sterilization of the distillate must take place as quickly as possible and not later than three hours. All tubing needles and glassware which are used for the operation of injection are cleansed with green soap solution and distilled water. Here also sterilization must be carried out within three hours. Only chemically pure salt and glucose are used in making up injection solutions. These precautions, while simple enough cannot be too carefully carried out.

It is stated that, with the technique adopted, 570 intravenous infusions of saline and glucose have been given "with not a single untoward reaction." An important and reasonable recommendation is made that — "Hospitals and Municipalities during cholera epidemics should cooperate for the preparation and wholesale distribution from

a central laboratory of fresh distilled water freshly distilled and sterilized water or better the saline or glucose solutions ready for infusion
W F H

BANERJEE (D N) Reaktion nach Salzlösunginfusionen bei Cholera. [Reaction after Saline Injection in Cholera.]—*Arch f Schiffs u Trop Hyg* 1938 Dec. Vol 42. No 12. pp 543-547

As a consequence of the intravenous injection of salt solution in cholera patients a rigor is a very common (81 per cent) result and it may be slight moderate or severe. The experience of the author was gained from 1 714 injections in 1 000 cholera patients and the principle followed was to regulate the injection so that its temperature should be as much above 36.7°C (98°F) as the rectal temperature was below it. Usually 1 pint of alkaline isotonic solution (sod chloride 90 grs sod. bicarbonate 160 grs. freshly sterilized tap water 1 pint) was given first followed by 1 to 6 pints of ordinary normal or hypertonic salt solution (sod chloride 120 grs. calc chloride 4 grs. freshly sterilized tap water 1 pint) according to the indication given by the specific gravity of the blood. A considerable number of the patients also received 25 to 50 cc of a 25 per cent glucose solution. It was found advisable before beginning the saline injection to reduce the high rectal temperature by an enema of 15 to 20 ounces of ice-cooled normal salt solution as in this way the reaction appeared to be diminished in intensity
W F H

OMAR (Wassif) The Bacteriophage in the Treatment and Prophylaxis of Cholera.—*Jl Egyptian Med Assoc* 1938 Aug Vol 21 No 8 pp 491-501 [21 refs.]

CHATTERJEE (S K.) & DEO (L. R S) Some Factors controlling the Activity of Bacteriophage and the Method of filling Medicinal Phials with Bacteriophage Suspension as practised in the Bacteriophage Laboratory Government of Bihar.—*Jl Indian Med Assoc* 1938 Dec Vol 8 No 3 pp 141-144

Treatment to be effective in a disease like cholera must be rapid and consequently the bacteriophage to be used in cholera therapy must be of quick acting type. It is on this account that the dominant phage used is of the A type which has a generation period of under one hour. Freshly isolated A phages are very unstable and have to be adapted to laboratory conditions and to as many strains of smooth vibrios as possible. It is this phage which can be separated in a large proportion of convalescents and this is held to be an indication that it is the phage mainly concerned in bringing about the cure of the patients. An endeavour should be made however to combine other cholera phages with the A phage and indeed the phage mixture issued for therapeutic purposes should contain all available types of phage. A very essential point in cholera phage therapy is also its administration in massive doses at the earliest opportunity. It may be used up to 9 months after preparation.

A filling process is described in which filtration of phage suspension and filling of medicinal phials are all done in one operation instead of two
W F H

SMITH (H F) *Revue des mesures adoptées pour empêcher l'introduction du choléra dans les îles Philippines en 1937* [Prevention of Cholera in the Philippines in 1937]—*Bull Office Internat d'Hyg Publique* 1938 July Vol. 30 No 7 pp 1524-1545. With 6 figs. on 1 plate

Cholera has ravaged the Philippines in the past and the stringent regulations now adopted can claim to have eliminated practically all danger of entry of the disease by sea. In 1902 there were notified 13 755 deaths from cholera and in 1903 there were 82,843. This state of affairs continued up to 1909 with variations from 472 to 28,868 deaths yearly. Since 1910 there have been accidental epidemics but none has attained the proportions of the earlier years. With the exception of one case in 1935 and one in 1937 the Philippines have had no cholera since the beginning of 1934. There is very direct and constant communication between Manila and Hong Kong which are distant only 36 to 48 hours by sea, so that the result attained is obviously due to the measures adopted for prevention of cholera entry by passengers or crew. Great attention is paid to avoidance of undue or indeed any delay to ships in taking or discharging cargo and such delay as is suffered by passengers who are suspect is made as pleasant as possible. The article consists of a description in most minute detail of how passengers and sailors are examined, how stools are obtained for examination and how the individuals concerned are identified with certainty. A study of this detail will be of great use to those engaged in the same practice or who propose to put similar procedure into operation. It is well to note that "in the Philippines the needs of quarantine demand that the discovery of the cholera vibrio in the stools whether agglutinable or not, suffices to label the person who has furnished the stool a carrier and to justify his isolation and his treatment." W F H

WAHBI (Subhi) *Rapport bactériolo-parasitologique sur l'examen des pèlerins au laboratoire de la quarantaine à Najaf (février-mars 1938)* [Examination of Pilgrims at Najaf.]—*Bull Office Internat d'Hyg Publique* 1938 Nov Vol. 30 No 11 pp. 2531-2533

The route across the desert from Irak to Mecca is important because it is the shortest for pilgrims from Afghanistan, Iran and Irak, and, moreover, gives the pilgrim an opportunity of visiting the holy places of Najaf and Karbala. Arrangements have been made for quarantine of returning pilgrims at Rabha near the Irak frontier and laboratory examination directed from Najaf. An *El Tor vibrio* has already been isolated and a considerable infection with pathogenic *Intest. All.* protozoa and helminths demonstrated among pilgrims. *Intest. All.* and water here

FEDERATED MALAY STATES. *ANNUAL REPORT* free hours. Only chemical research for the year 1938. Using up injection solutions. Director] [Cholera pp. 14-19. Such cannot be too carefully

A striking testimony to the technique adopted, "570 intravenous quarantine service is the technique adopted, "570 intravenous occurred in the territory. Glucose have been given with not a single caught at Port Swettenham. An important and reasonable recommendation for 2 000 persons. Hospitals and Municipalities during cholera epidemics. The preparation and wholesale distribution from

Malay States are four. This vaccine contains Inaba and Ogawa sub-types in approximately equal proportions with the idea of providing the various antigens required to produce a satisfactory immunization response. W F H

YU (H) The Virulence and Immunogenic Activities of *V. cholerae* in the Preparation of Cholera Vaccine.—*Chinese Med J* 1938 Sept Vol. 54 No 3 pp 255-258

The strains of *V. cholerae* used in this investigation were 37 isolated in Shanghai in 1932-36 and the Lister Institute strain. A conclusion is reached from experiments on mice that the smooth strains of *V. cholerae* vary in virulence and protecting capacity. Cultures used in the preparation of cholera vaccine should be selected because of their high virulence in animal test. W F H

PASRICHA (C L), CHATTERJEE (D N) & PAUL (B M) Studies on the Potency of Prophylactic Vaccines. I. Cholera Vaccine.—*Indian Med Gaz* 1938, Aug Vol. 73 No 8 pp 463-465

Cholera vaccines as used in India are of three main sources: recognized laboratories, local commercial firms and foreign. Fourteen examples of vaccines were examined for (1) sterility, (2) freedom from abnormal toxicity, (3) antigenic response in rabbits, (4) antigenic response in man and (5) protective value in guineapigs. It was found that—(a) All the vaccines were sterile and free from abnormal toxicity. (b) All the six cholera vaccines from recognized laboratories gave satisfactory antigenic response and protected guineapigs against 2 M.L.D. of *V. cholerae*. (c) Four of the eight commercial preparations of cholera vaccines produced cholera agglutinins and possessed protective properties and four vaccines gave uniformly negative results. W F H

CARO L'épidémie de choléra de 1937 à Haiphong. Les enseignements de la campagne de vaccination. [Vaccination at Haiphong in the Cholera Epidemic of 1937].—*Ann de Méd et de Pharm Colon* 1938, July-Aug-Sept. Vol. 36 No 3 pp 726-731

Recorded deaths and cases seem to show that the cholera epidemic of 1937 which visited Haiphong was one of the most severe of recent years. Some of its severity may be traced to the incursion of refugees. A remarkable effort was made by the authorities to apply anti-cholera vaccination on a large scale in record time to counter the menace. Vaccination began on 23rd September and had been carried out on 41,000 individuals by 3rd October. A total of 158,000 mainly concerned was reached. The dose administered was single and should be millions of organisms being designed to bring about with the A phage and indeed the number of persons. Ten days after the purpose should contain all available cases steadily decreased by lysis. An point in cholera phage therapy is also shown by hospital showed that 94 per doses at the earliest opportunity. It may be testimony to the value of preparation. the fact that in Haiphong
A filling process is described in which filtration on a large scale. It was and filling of medicinal phials are all done in one throughout the Tonking two

delta for long after. No evidence of any influence exerted by vaccination to mitigate the severity of the attack in the individual could be obtained. *W F H*

QUEMARD. Vaccination anticholérique. [Anti-cholera Vaccination.]
—*Rev Méd Française d'Extrême-Orient*. 1938. Apr Vol. 17
No 4 pp 416-425

There is abundant evidence that in Tonking a very active campaign of vaccination against cholera was undertaken for 6,500 000 inoculations were performed in the short space of 4 months.

Many reports were received of the efficiency of the vaccination procedure but these reports were by no means all favourable. *W F H*

MALARIA

PRÉCIS OF ABSTRACTS IN THIS SECTION

MACKAY (p 387) shows that in Dar-es-Salaam *A. gambiae* flourishes in the rainy season and *A. funestus* in the dry and that both are important in transmission which is therefore continuous. Carriers on the outskirts of the town form a permanent reservoir of infection.

BUSCH (p 388) gives information on malaria in the German navy during the war.

PARROT and CATANEI (p 388) show that premunition is established in Algiers about the tenth year of age. It is more ephemeral in *P. falciparum* infections than in the others and excessive prevalence of vectors causes violent *P. falciparum* epidemics from time to time partly because of the disappearance of premunition to that species. LEFEBVRE (p 389) reports that malaria in Laos is endemic and shows little variation from season to season. Epidemics are practically unknown. *P. falciparum* is the commonest parasite and *A. minimus* the most important vector.

CHRISTOPHERS and SINTON (p 390) enquiring into the history of the nomenclature of malaria parasites show that the common names *P. vivax*, *P. malariae* and *P. falciparum* are justified.

CIUCA *et al* (p 390) from studies of 3 strains of *P. vivax* conclude that individuals in Rumania are more susceptible to an imported strain than to one of local origin and if infected with a local strain possess a relative immunity towards an imported strain. Maintenance of a local strain in a non-endemic country did not bring about any change in it.

MISSIROLI (p 391) recounts the effect of the different races of *A. maculipennis* on the epidemiology of malaria. TOUMANOFF (p 391) found that the interval between feeding and egg laying of *A. hyrcanus* var. *sincensis* varies between 12 and 100 days in winter and is about 9 days in the hot weather. He has (p 391) succeeded in carrying this mosquito through two generations in the laboratory.

CICCHITTO (p 392) found a high degree of reticulocytosis in malaria especially in malarial anaemias. CARROT and FABIANT (p 392) describe a patient who died with an acute jaundice syndrome. Subperitoneal haemorrhages were found in the upper abdomen and the syndrome was ascribed to malaria. GREEN (p 392) describes malaria in 3 infants diagnosed by blood examination within two days of birth and MEASHAM (p 393) one in whom the blood was positive 17 days after birth in the non-transmission season.

SHUTE and BADENSKI (p 393) stress the importance of the diagnosis of the species of infecting Plasmodium and of aborting induced primary attacks of *P. falciparum* malaria at about the tenth day. A single negative blood film is not enough to exclude the diagnosis of malaria.

TRENSZ (p 394) describes Henry's reaction and CHORINE (p 394) shows that flocculation in distilled water closely resembles melanoflocculation. Melanin is merely an indicator and can be replaced by other substances. The reaction only becomes positive when the euglobulins form 32 per cent. of total serum proteins. The degree of dilution or concentration of hydrogen ions is the determining factor. The reaction has undeniable clinical value. SICAVLT and MESSERLIN (p 395) describe a method to determine the maximum dilution which gives a positive reaction. AZZI and DEL FRADK (p 395) found that serum from

non-syphilitic infants suffering from malaria may give positive serological tests for syphilis.

SIXTON (p 396) records the action of atabrin upon gametocytes of *P. falciparum*. DE MELLO (p 396) and also CHOPRA (p 396) review the drugs used in malaria. GÖRZ (p 396) considers cinchona febrifuge more effective than quinine, and GURST (p 397) found Malarene to be less so.

LUCHERINI (p 397) describes a patient suffering from chronic malaria who developed haemoglobinuria after taking atabrin but further treatment with atabrin produced no ill effects. LIVADAS *et al* (p 397) compared quinine, atabrin and plasmoquine in treatment of quinine and plasmoquine have special advantages. CHOREMIS and SPILIOPOULOS (p 398) record cases of temporary laryngeal and peripheral paralysis in children after the administration of atabrin and plasmoquine which are therefore neurotropic and should be given in courses not exceeding five days.

After testing mapharsen in the treatment of induced *P. vivax* malaria GOLDMAN (p 398) concludes that it is the drug of choice, being as effective as atabrin, easy to administer and safe. It has not been tested in *P. falciparum* infections.

NIYEN (p 399) tested sulphathiazole in the three malarial infections but found it to be much less efficient than quinine and much more costly but SORLEY and CURRIE (p 400) found it useful in *P. vivax* infections especially if followed by atabrin.

PIZZELLO (p 400) draws attention to the substantial identity of the mechanism of Ascoli's treatment and of natural climatic therapy and (p 400) describes these activations which occur after the completion of the Ascoli method of treatment. The late febrile manifestations differ from relapses in that recovery is spontaneous and the interval between the end of treatment and the onset of the reactivation attack varies inversely with the duration of infection.

SIXTON *et al* (p 401) found that Certuna failed to prevent infection with *P. falciparum* in experiments on five patients.

The Malaria Commission of the Council of Public Health of Holland (p 401) conclude that a therapeutic campaign is not at present practical. The killing of all *Anopheles* in summer and autumn should reduce malaria in the following year to one-fifth of its ordinary frequency but spraying with Shelltox should be performed every 14 days. This method is costly. As *A. maculipennis atroparvus* prefers water containing 1500 mgm. chlorine per litre to lower concentrations, the change of the IJsselmeer from salt water to sweet water will eliminate breeding places of this vector.

STROTHER SMITH (p 403) reports that the emptying of all water receptacles including tanks and irrigation ditches, from 6 a.m. to 9 a.m. on one day each week and the cleaning of the edges of larger collections of water has markedly diminished the prevalence of mosquitoes in certain cantonments in Northern India. MICHELSON (p 403) describes a method, depending upon a gunny screen supplied with oil by means of a wick for the continuous oiling of streams. KING (p 403) found phenothiazine in sulphonated petroleum oil and acetone to be an efficient *Culex* larvicide in the laboratory.

BRUMPT (p 404) considers that foreign bodies in the tissues of mosquitoes are liable to undergo chitination, and oocysts and sporozoites are no exception to this rule and chitin may be deposited

round groups of the latter. The presence of black spores of the type associated with malarial infection is an indication that infection has occurred.

COGGESHALL and EATON (p. 404) have prepared antigens from blood and spleen of infected monkeys which give complement fixation reactions with the serum of infected animals. Protective antibodies and complement fixing antibodies are probably distinct. EATON (p. 405) shows that in monkeys infected with *P. knowlesi* agglutinins appear between the 15th and 45th day which are specific for that species and act only on mature parasites. COGGESHALL and EATON (p. 405) show that in monkeys the interval between infection and appearance of parasites varies with the number of parasites injected but the severity of the disease does not. Serum from chronically infected monkeys will protect against death if suitably administered and the optimum protection is obtained with serum from monkeys superinfected seven times during the course of two months (COGGESHALL and KUMAR p. 406). C IV

COLONIAL DEVELOPMENT FUND (MALARIAL RESEARCH SCHEME)
Second (Final) Report of the Malaria Unit, Dar-es-Salaam for the Period November 1934 to December 1936 [MACKAY (R.) Malaria Research Officer Tanganyika Territory]—61 pp. With 10 charts 2 maps 4 plans 1 histogram & 22 figs. on 6 plates 1938 Dar-es-Salaam Govt. Printer [5s.]

The first report of the Dar-es-Salaam Malaria Unit was abstracted in this *Bulletin* 1936 Vol. 33 p. 225. This final report completes the narrative.

The local species of *Anopheles* are *gambiae funestus maculipalpis squamosus mauritanus* (and var. *lencobrosus*) *marshalli gambiae* var. *melas* and *nisi*. Only the first two are important vectors; some of the others have been caught in houses but none has been found infected. There is a retarding of the parasite development rate in *Anopheles* and a decrease in the number infected during the dry season. The average infection rates for three years 1934-36 were: *A. gambiae* oöcysts 2.15 sporozoites 3.46 per cent. *A. funestus* oöcysts 0.83 sporozoites 2.76 per cent. The numbers of *Anopheles* dissected were, *gambiae* 18,511 and *funestus* 19,055. *A. funestus* is as important as *A. gambiae* in the local transmission of malaria. The *gambiae* infection rate curve follows the rainfall curve; *funestus* flourishes best in the dry season. Thus malaria transmission goes on almost without remission. *A. gambiae* breeds in road puddles, hoof marks, gravel pits, and in similar small collections of water. It is a more urban species than *funestus* which breeds in grass-protected still water with varying degrees of shade. Examination of the pH of water of breeding places of the two species showed that pH 7.6-8.0 was most common. *A. gambiae* var. *melas* was found breeding in water with a saline content as high as 3,267 parts NaCl per hundred thousand; it has not been found infected.

Mean spleen rates for ages 0 to 5 were 88.2 and for ages 6 to 10 79.4 per cent. which are indicative of very early infestation. The infection rate is fairly constant throughout the year. The trend of the graph showing the number of parasites per cubic millimetre of blood follows closely that of the infection rate of *Anopheles*.

The anti-malarial measures that have been or are being taken, are fully described. Human carriers living on the outskirts of the

town are a permanent reservoir of infection for *Anopheles* breeding in the vicinity and thus intensify the infection of those living on the periphery of the controlled area. A protective zone free from uncontrolled dwellings is advocated. Attention is given to man-made *Anopheles* breeding-places and to how these should be avoided. Appendices reproduce the text of local legislation for the control of malaria and specimen copies of propaganda pamphlets.

This report together with its predecessor forms a very informing record of an unusually complete malaria survey Norman White

BRUCH (Hans-Gerhard) *Die Malaria in der Geschichte der Völker* [Malaria in the History of Populations].—Reprinted from *Veröffentlichungen d. Gebiets des Marins Sanitätsdienstes* 1938. No. 30 pp. 93-146. [89 refs.]

This is a thesis submitted for the degree of doctor of medicine by the author who qualified in 1937 and is now in the German navy. It is an interesting study of the literature of the subject. Some of the statistical data which he gives regarding malaria in the great war are taken from the official reports and are of considerable interest. Thus in the five years of war 1,068,848 men were mobilized in the German navy. Of this number 1,872, 1.77 per mille were attacked by malaria, including blackwater fever. Of the 1,872, 1,844 were returned fit for service 9 died, 1 was partially unfit for service. He considers that the small number of cases in the navy can be attributed to the special skill of German naval medical officers. He gives the following comparative table of malarial morbidity and mortality in Macedonia quoted from Ziemann —

	In the British Army			In the German Army		
	Attacked		Died	Attacked		Died
	Number	0/00	0'00	Number	0'00	0'00
1916	32,019	256.5	2.3	5,004	53.6	0.61
1917	71,412	391.1	1.3	16,672	141.2	0.92
1918	59,087	458.9	2.1	—	—	—

E. D. W. Greig

PARROT (Louis) & CATANET (Antoine) *Sur les facteurs d'apparition des épidémies de paludisme en Algérie.* [The Factors determining Epidemic Malaria in Algeria].—*C. R. Acad. Sci.* 1938 Nov 2. Vol. 207 No. 18 pp. 809-811

Exceptional circumstances enabled the authors to study the natural evolution of *falciparum* malar and *malariae* infections in a population of 1,878 Berbers very highly infected, without medical assistance, and temporarily protected from reinfection. Abnormally frequent and violent rainstorms prevented the formation of anopheline breeding places throughout the transmission season. Blood examinations of the entire population were made monthly or bi-monthly for 14 months.

Malarial infections were twice as frequent below the age of 15 as above that age. At all ages *P. falciparum* was most in evidence.

Between the ages of 11 and 15 the frequency of *falciparum* decreased about a third of *vivax* about a half and of *malariae* about four fifths. Above the age of 15 up to 50 the index of infection for all three species remained fairly constant. In all infected persons parasites were scanty in the peripheral blood especially in adolescents and adults. Gametocyte carriers were 5 per cent. of *falciparum* infected 42.8 per cent of *vivax* and 63.6 per cent of *malariae*.

These observations tend to confirm the observations of Edm. SERGEANT that premunition is established among the infected population of Algeria about the 10th year. It is less complete less early and more ephemeral in the case of *falciparum* infections than in those of *malariae* and *vivax*. The proportion of gametocyte carriers among the infected by the three species indicates that old cases of *vivax* and *malariae* constitute in Algeria more important reservoirs of endemic malaria infection than do old cases of *falciparum*. It is but rarely that *vivax* and *malariae* occasion violent epidemics. premunition against these species is more lasting. Excessive prevalence of anopheline vectors causes from time to time violent *falciparum* epidemics partly because the premunition acquired in the previous epidemic has in large part disappeared.

N IV

LEFEBVRE Recherches sur le paludisme au Laos (Investigation of Malaria in Laos).—*Rev Méd Française d'Extrême-Orient* 1938. Apr Vol 17 No 4 pp 336-354 With 3 graphs.

Reports have appeared from time to time regarding the prevalence of malaria in different parts of Laos but this is the first comprehensive report dealing with malaria conditions in Laos as a whole. Laos is a territory about half the size of France it forms a strip in parts a narrow strip of country running north-south between Annam the frontier with which is formed by a high mountain chain and the river Mekong which bounds it on the west. The widest northern part of the country is very mountainous. The only low lying area is found in the valley of the Mekong this narrow strip of flat land consists of rice fields and cleared forest. It is the most densely populated area. The rainy season is from mid-April to the beginning of October. The total annual rainfall varies from 1.70 to 3.70 metres according to locality.

With the exception of certain centres on the banks of the Mekong where malaria is little if at all endemic the rest of the country is severely infected. Very severe forms of the disease are encountered but these affect for the most part new arrivals. Judging from hospital returns the disease is most prevalent in the rains but the disease among the indigenous population is characterized by chronicity prevailing everywhere without intermission and with but little variation from season to season or from year to year. Epidemics of malaria are practically unknown. The spleen index of children from 2 to 12 years of age is 59 per cent and the parasite index 43 per cent. These are average rates for children from all parts. In some of the mountainous regions spleen and parasite rates from 60 to 90 per cent have been recorded. Excluding hospital cases parasites found were *falciparum* 63.9 *vivax* 20.4 and *malariae* 15.7 per cent. Splenic enlargement is less pronounced among *vivax* carriers than among *falciparum* and *malariae* carriers. Eighteen species of anophelines were found. *A. minimus* is the most important vector. Thanks to the

adaptability of its larval form this species persists throughout the year. In some localities and at certain seasons *A. maculatus*, *A. jeyporiensis* and *A. leucosplyrus* are effective vectors. Malaria is the most important cause of sickness and death in Laos. N IV

CHRISTOPHERS (Rickard) & SIXTON (J. A.) The Correct Name of the Malignant Tertian Malaria Parasite.—*Brit. Med. J.* 1938. Dec 3 pp 1130-1134 [32 refs.]

The authors of this informing contribution explain the causes and origins of the confusion attendant upon the multiplicity of names that have been bestowed upon the parasite of malignant tertian malaria. *Plasmodium falciparum* is now more generally adopted than it was a few years ago but there are authors who persist in calling the parasite *P. praecox* and some *P. immaculatum*. Uniformity is greatly to be desired. The account given of the earliest published descriptions of the three malaria parasites is of great interest. It explains why the *de jure* nomenclature of the parasites of benign tertian, quartan and malignant tertian malaria, viz. *Oscillaria vivax* (Grassi and Feletti), *O. quateriana* (Celli and Sanfelice) and *O. malarialis* (Laveran) was never generally adopted and how an opinion of the International Commission of Zoological Nomenclature justifies the adoption of the names now most commonly used, viz. *Plasmodium vivax* (Grassi and Feletti), *P. malarialis* (Grassi and Feletti) and *P. falciparum* (Wied.) N IV

CITCA (M.), BALLIF (L.), CHELARISCO (M.) & LAURENTE (N.) Contributions à l'étude de l'infection expérimentale au *Plasmodium vivax* (Etude comparée de trois souches du parasite.) [Experimental Infection with *P. vivax*. Comparative Study of Three Strains of the Parasite.]—*Arch. Roumaines Path. Expériment. et Microbiol.* 1937. Sept. Vol 10. No 3. pp 217-265. With 18 graphs.

Working in Rumania the author has investigated during a number of years three strains of *Plasmodium vivax* in their passage through series of paralytics. Two of these strains were of local origin while one was an imported one the "Madagascar" strain from Horton in England, where it had been maintained for some years. In these studies one of the local strains was sent to Horton, where it was maintained in paralytics for two years. It was then sent back to Rumania. Similarly, the "Madagascar" Horton strain yielded another line after it had been kept for some time in Holland, again at Horton and finally in Rumania. The object of these transfers was to discover if there was any difference between the influence of a malarial and a non-malarial country. The various passages amounting to many hundreds, were effected mostly by blood inoculations but from time to time mosquito transmissions were effected.

The studies involved a careful morphological investigation of the strains at different stages and a detailed analysis of the case records of each patient from the point of view of incubation period, duration and height of fever, tendency to spontaneous recovery, response to drug treatment and the many other characters which may be grouped under the heading of biological features. The paper is a long one and contains numerous protocols which will have to be studied in detail by those who wish to weigh the evidence on which the conclusions

are based. They are these: The individuals inoculated are more susceptible to an imported strain than to one of local origin. The maintenance of a local strain in a non-endemic country did not bring about any change in the strain. Individuals who have been infected with a local strain have a relative immunity towards an imported strain. As regards their response to drug treatment it was not possible to distinguish between imported and local strains. C. V. Henry

MISSIROLI (A.) Varieties of *Anopheles maculipennis* and the Malaria Problem in Italy—Internat. Congress of Entomology, Berlin 15th-20th Aug. 1938. With 6 figs on 1 plate 2 maps & 1 graph.

The author retells the story of the observations and investigations that led to the identification of the different races or varieties of *A. maculipennis* and shows how the geographical distribution of these varieties with their differing biological characteristics explains the vagaries of malaria distribution in Italy. The author's own contributions to these observations have been important. The paper is interesting but contains nothing that has not been previously published and duly noted in this *Bulletin*. N. H.

TOUMANOFF (C.) Au sujet de l'asthénie observée chez les femelles de *A. hyrcanus* var *sinensis* du Tonkin pendant la période hivernale et de ses conséquences probables dans la transmission du paludisme [On the Retarded Winter Development ("Asthenia") in Female *A. hyrcanus* in Tonking, and on the Relation of this to the Transmission of Malaria by this Insect.]—*Bull. Soc. Path. Exot.* 1938 Oct. 12. Vol. 31 No. 8 pp. 733-736.

In Tonking *Anopheles hyrcanus* var *sinensis* does not actually hibernate but the interval between feeding and egg laying becomes greatly extended in winter. It may apparently range from about 12 days to over 100, the period in the hot weather being about 9 days. At the cold time of the year the females which are to some extent domestic feed readily which may give the species considerable importance locally as a vector of malaria. The author develops the parallel between this species and *A. maculipennis atroparvus* of Holland. In certain other species of mosquitoes which have been studied in Tonking the effect of winter in retarding the development of ovaries is not so great as it is in *hyrcanus*. P. A. Buxton

TOUMANOFF (C.) Les résultats de l'essai d'élevage au laboratoire de *A. hyrcanus* var *sinensis* Wied. [Rearing *A. hyrcanus* var *sinensis* in the Laboratory]—*Rev. Méd. Française d'Extrême-Orient* 1938 Apr. Vol. 17 No. 4 pp. 355-364. With 4 figs. [19 refs.]

Anopheles hyrcanus var *sinensis* has been carried through two generations in the laboratory. Some difficulty was encountered for a large proportion of the females which emerged failed to become fertilized. The total number of species of *Anopheles* which have been bred successfully in the laboratory is still few. [See also this *Bulletin* 1938 Vol. 35 p. 194.]

The author also discusses what is known at present about the structure of the surface of the egg of this species. It is already known that this species produces eggs of several different types but whether the differences are genetic or due to environment is not known.

The paper contains a discourse on the views of ROUBAUD about stenogamy which is consistently mis-spelt sibengamy

P A Buxton

CIOCHITTO (Angelo M.) Reticolociti e infezione malarica. [Reticulocytosis and Malarial Infections.]—*Riv di Malarologia* Ser I 1938 Vol 17 No. 4 pp 282-287 French summary

A study of eighteen cases of malaria in the tropics, with special reference to reticulocytes led to the following conclusions. A moderate or high degree of reticulocytosis is observed in malarial infections, and is most marked in malarial anaemias. There appears to be no relationship between the degree of reticulocytosis and the species of malaria parasite, but the former does vary directly with the degree of malarial anaemia and also with the splenic index in primary infections. In cases of malarial haemolytic jaundice reticulocytosis is well marked and persists until recovery is complete. Specific treatment brings the number of reticulocytes within normal limits *pari passu* with the return of the blood to normal

N IV

CARROT & FARIANI (G.) Syndrome douloureux abdominal palustre. [Painful Abdominal Syndrome in Malaria.]—*Bull Soc Path. Exot.* 1938 Nov 9 Vol 31 No 9 pp 841-843

An Algerian aged 21 suffered from chronic malaria of long standing. He was admitted to hospital with the symptoms of acute appendicitis and was submitted to operation. The appendix appeared to be practically normal. Three months later he was once more admitted to hospital suffering from abdominal pain, diarrhoea, vomiting and fever. *Schizonts of falciparum* were found in the blood. He was treated with quinine the temperature fell and the symptoms improved. A week after the beginning of the attack fever returned, bilious vomiting and jaundice appeared. The abdomen was very painful and there was marked rigidity in the epigastric region. scanty urine albuminuria, blood urea 0.95 and very numerous parasites in the blood. Quinine was given intramuscularly and intravenously. The patient died. Post-mortem examination showed enlarged liver and spleen. There were small sub-peritoneal haemorrhages, either discrete or in patches more or less circular and measuring several centimetres across. These haemorrhages were confined to the upper part of the abdomen. Most were in the submesocolon chiefly in the cavity behind the omentum, or near the base of the omentum along the course of the great mesenteric artery. The mesenteric glands were slightly enlarged. There was no perivisceritis.

The patient thus died with an acute jaundice syndrome. The pain and the lesions were both confined to the upper part of the abdomen. It would seem then that an acute malarial abdominal syndrome can be caused by sub-peritoneal haemorrhages. The authors are tempted to postulate an involvement of the sympathetic nervous system in this case.

N IV

GREEN (J G.) Three Cases of Subtertian Malaria in the Newborn.—*West African Med J* 1938, Oct Vol. 10 No 1 p. 42.

A woman at full term was admitted to hospital suffering from severe malaria. a child was born after an easy labour 24 hours later. The placenta appeared normal and no parasites were seen in the baby's

blood. The following day the infant died in coma with hyperpyrexia. On post mortem examination the brain was found to be congested and four parasites per field were seen in smears of blood from the cerebral veins.

The second case was that of a primipara who had two rigors during labour. malaria parasites were found in the blood. The child was born cyanosed and comatose. No parasites were found in blood from the cord and the placenta appeared normal. The infant's blood contained parasites, however four to the field. Both infant and mother made good recoveries under quinine treatment.

In the third case an infant two days after a normal labour had an attack of malaria. parasites were found in the blood. Quinine effected a cure. The mother showed no clinical signs of malaria, but four days after delivery her blood contained malaria parasites.

N IV

MEASHAM (J. E.) A Case of Congenital Malaria.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938 Nov. 28 Vol. 32 No. 3 pp. 423-425. With 3 charts.

A primipara suffered during the 16th week of pregnancy from an acute attack of *vivax* malaria which was treated with atabrin. A relapse in the 38th week also treated with atabrin caused the onset of labour. At the time of delivery no parasites were found in the peripheral blood of the mother nor in the blood of the infant which was examined daily for 10 days. Placental smears showed numerous *vivax* rings, schizonts and gametocytes. When 17 days old the infant had a temperature of 102°F. Its blood then contained *vivax* rings, schizonts and gametocytes. This occurred in the non transmission season when careful search failed to find a single specimen of *A. fluviatilis* the only proved local carrier. The author considers this to be a definite case of congenital malaria.

N IV

SHUTE (P. G.) & BADENSKI (G.) A Study of the Numerical Prevalence of Asexual Parasites in Primary Malaria.—*Arch. Roumaines Path. Experim. & Microbiol.* Paris. 1937 Dec. Vol. 10 No. 4 pp. 453-459. With 7 charts on 2 folding plates.

Seven cases of primary induced malaria, three *falciparum*, two *vivax* and two *malariae* were studied. Blood films were made and parasites counted by Sinton's method, twice daily. The authors found that during the first few days it is often impossible to find parasites. This is markedly so in *malariae* infections, frequent in *vivax* infections but less frequent in *falciparum* infections. The primary fever in all three infections is in most cases intermittent (remittent?). Fever of this type persists longer in *falciparum* than in other infections, often 7 to 10 days. The necessity for aborting *falciparum* attacks is urgent on or about the tenth day. It is generally advisable in *vivax* infections but *malariae* infections may generally be allowed to continue unchecked. In *vivax* infections the number of parasites in the blood is of less importance than the number of generations of parasites. The lowest parasite counts are found in *malariae* infections. In the interest of the patient it is not of first importance to find out how many parasites he has in the blood. It is important to diagnose the species and to determine whether it is a primary attack. Greater care is needed in the treatment of primary cases than of relapses and *falciparum* cases.

call for more careful treatment than do *typhus* and *malaria* infections. When fever is intermittent (remittent?) a single blood film is not sufficient to exclude the diagnosis of malaria. If necessary blood films should be examined three or four days in succession before deciding that the case is not malaria.

N IV

TREKSZ (F) *Technique de la mélanoflocculation de Henry modifiée.* [Modified Technique of Henry's Reaction.]—*Arch Inst Prophylactique* 1938 July-Sept. Vol. 10 No. 3. pp. 217-221

A detailed account of the technique of Henry's reaction including the preparation and standardization of the reagent.

N IV

CHORINE (V) *La réaction de Henry.* [Henry's Reaction.]—*Arch. Inst. Prophylactique* 1938. July-Sept. Vol. 10 No. 3 pp. 202-216. With 1 fig.

This is an excellent account of Henry's reaction and sets forth the author's views of the nature of the reaction which are founded on prolonged research and are well known. The reaction is not due to the presence of antibodies in the serum. Melanin has neither the properties of an antigen nor of a toxophore group except for organisms normally deprived of this pigment. Positive reactions are met with in diseases in which there is no production of pigment, and in fowl malaria the feebly positive reaction normally found in fowls decreases during the course of the disease. The intensity of the reaction may vary from day to day in the same serum kept on ice. The reaction only occurs in distilled water or in hypotonic solutions: this is unlike the behaviour of antibodies. Flocculation in distilled water closely corresponds to melano-flocculation. The action of melanin is that of an indicator in which rôle it can be replaced by numerous other substances. The chemical mechanism of the reaction is complex: the chief rôle is played by euglobulins. The precipitation of euglobulins is only evident in a dilution of 1 in 10 without an indicator or of 1 in 4 or 5 with an indicator. A positive reaction only occurs when euglobulins form 32 per cent. of the total proteins of the serum: above this amount the intensity of the reaction is proportional to the quantity of euglobulin present. Malarial euglobulins have no special affinity for melanin: they differ in no way from the euglobulins of normal serum. Heating the serum to 55°C. for half an hour abolishes the melanin reaction: this is due to the alkalization of the serum consequent on the loss of CO₂. From the clinical point of view the measurement of flocculation of the serum in a dilution of 1 in 10 distilled water gives similar results to its measurement in a 1 in 5 dilution with an indicator added. In therapeutic malaria Henry's reaction becomes positive from the 3rd to the 5th day after injection of malarial blood. The reaction has undeniable clinical value. A negative reaction during a period of apyrexia excludes a diagnosis of malaria: a positive reaction is a sign of probability.

N IV

CHORINE (V) *La réaction de Henry n'est due qu'à des modifications quantitatives dans le sérum.* [Henry's Reaction only due to Quantitative Changes in Serum.]—*Bull. Soc. Path. Evol.* 1938 Nov 9 Vol. 31 No. 9 pp. 838-840

The author restates his view that flocculation produced by distilled water and the flocculation of Henry's reaction are essentially the same.

They are exactly parallel phenomena. Dilution of the serum with hypotonic solutions of ammonium chloride renders the euglobulins unstable. The greater the proportion of insoluble proteids to total proteids the more rapidly is this instability brought about. Another very simple method of rendering the euglobulins unstable is to lower the pH of the serum to near the isoelectric point of globulins. No matter what serum is acidified with hydrochloric acid it flocculates with melanin in certain limits. The addition of more acid prohibits flocculation. The degree of dilution or concentration of hydrogen ions in the serum is the determining factor. Malarial euglobulins have no special affinity for melanin. The author describes experiments proving his contentions.

N II

SICAULT (G.) & MESSERLIN (A.) Note sur une technique nouvelle de mélanoflocculation en échelle. [New Technique for Graduated Melanoflocculation Test.]—*Bull Soc Path Exot* 1938, Nov 9 Vol. 31 No 9 pp 834-837

In the absence of a photometer which not every laboratory possesses it is not possible to measure the intensity of flocculation either with the technique of Henry Villain or Trenszt. It is the same with the distilled water reaction of Chorine. For this reason the authors of this paper have designed a method to determine the maximum dilution which gives a positive reaction. The test is carried out as follows —

Three rows of haemolysis tubes or preferably 7 mm tubes which the authors use for their micro-reaction are set up seven tubes in each row. In the first row are put dilutions of serum in NH_4Cl 9/1000 pH 7. The dilutions are 1/3 1/10 1/20 1/50 1/100 1/200 1/400. In each tube of the second row are put 9 drops of diluted antigen 1 in 5 (soluble melanin diluted with NH_4Cl 4 5/1000 pH 7). The third row are control tubes containing similar dilutions of serum to those in the tubes of the first row but in this case the diluent is NH_4Cl 4 5/1000 pH 6. Two drops from each tube of the first row are then put into the corresponding tube of the second row and shaken. The results are read at the end of three hours. In positive cases there will be a thick brown deposit in dilutions 1/3 to 1/10 and flocculation will be observed in higher dilutions, to a degree varying in different cases.

In the discussion of this paper V CHORINE said that it is more important to determine the maximum quantity of serum which will produce flocculation. This indicates the degree of instability of the serum. The minimum dose of serum capable of producing flocculation has a less precise significance.

N II'

AZZI (Antonio Sellek) & DEL FRATE (Alejandro) Reacciones serológicas de la sífilis y paludismo en la infancia. Revisión de la literatura y experiencia personal. [Serological Tests for Syphilis in Infants with Malaria Infection.]—*Archivos Med Infantil* 1938 July-Aug-Sept Vol. 7 No 3 pp 388-393 [17 refs] English summary

Diametrically opposite opinions have been expressed regarding the results of serological tests for syphilis in malarious subjects some maintaining that positive reactions may be given by the sera of malaria patients in whom there is no indication of syphilis others that such results are due to concomitant syphilis or the residue of former infection.

The authors have tested sera from twenty children 15 of whom were infected with *P. falciparum* and five with *P. vivax* but in none were there any signs of syphilis. By the Kahn technique two with *falciparum* infection gave positives (one plus, and three plus) and one with *vivax* gave a two plus, i.e. 3 of the 20 gave some degree of positive. By the Meinicke (K.R. II) three gave a one plus, also two *falciparum* and one *vivax* (but the two *falciparum* patients were not the same as those giving the reaction by the Kahn method) by a third method—a modification of M.K.R.II—five positives were obtained, the *vivax* as above and four *falciparum* patients, two of the latter (four plus) being patients whose sera had reacted negatively to the other two tests. The authors conclude that malaria may give positive reactions during an attack of fever. [These small figures are given as percentages 15 15 and 25 to the respective techniques if weak and strong be taken together] H H S

SINTOX (J. A.) The Action of Atabrin upon the Gametocytes of *Plasmodium falciparum*.—*Riv. di Malarologia* Sez. I 1938. Vol. 17. No. 5. pp. 305-330. With 1 chart 2 text figs. & 23 coloured figs. on 1 plate. [48 refs.] English summary

A summary of the observations recorded at length in this paper was presented by the author to the Royal Society of Tropical Medicine and Hygiene and was reproduced in this *Bulletin* 1938 Vol. 35 pp. 894-5.

A II

DE MELLO (I. Frolano) Chemoprophylaxis of Malaria in Portuguese India.—*South African Med. J.* 1938. Oct. 8. Vol. 12. No. 19 pp. 710-724. [46 refs.]

The title of this paper inadequately describes its contents. Therapeutics of malaria more nearly describes its scope for the vast majority of remedies that have been used in the treatment and clinical prophylaxis of malaria are passed in review and compared. No original observations are recorded. N II

CHOPRA (R. N.) Anti-Malarial Remedies. Natural and Synthetic.—*Calcutta Med. J.* 1938. Sept. Vol. 34. No. 3. pp. 183-193. [14 refs.]

This is an adequate description of the relative value of cinchona derivatives and synthetic drugs in the treatment of malaria for the guidance of the medical practitioner. It contains nothing original. V IV

GOMZ (Ramkrishna N.) Cinchona Febrifuge in the Treatment of Malaria.—*Indian Med. Gaz.* 1938. Oct. Vol. 73. No. 10 pp. 608-609.

Clinical experience has led the author to the conclusion that cinchona febrifuge is more effective than quinine in the treatment of malaria more effective in the reduction of splenomegaly and in the prevention of relapse. He appears to have used both drugs in smaller doses than those usually employed. The laxative effect of cinchona

febrifuge is referred to Cinchona febrifuge is of special value in rural communities honey which is available in villages is a good vehicle for making pills for adults or paste for children. N IV

GUEST (Columba) The Treatment of Malaria with Malarene.—*Bull Inst Med Res Federated Malay States* 1937 No 1 8 pp With 4 graphs.

Malarene is a proprietary preparation The manufacturers state that it contains the amorphous alkaloids of cinchona an alkaline nitrophenate and other valuable ingredients of strong antimalarial properties Fifty cases of acute malaria were treated in alternating sequence with malarene and quinine Malarene was inferior to quinine in controlling fever and in causing the disappearance of parasites from the peripheral blood Malarene gave rise to no toxic effects but some patients treated with it complained of headache and giddiness. N IV

LICHERINI (Tommaso) Primo caso in Italia di emoglobinuria da atebirin [First Case reported in Italy of Haemoglobinuria associated with Atebrin Treatment of Malaria]—*Polidimico Sez. Prat* 1938, Oct. 10 Vol 45 No 41 pp 1849-54 1857-9 With 1 chart

This is a long and detailed description of a case of haemoglobinuria in a patient who had been suffering from malaria of long duration During the three days previous to the onset of symptoms of haemoglobinuria the patient had been taking three tablets of atebirin a day and no other drugs It is interesting to note that after her recovery the patient was again treated with atebirin without any ill effects. A very high degree of leucocytosis up to 44 000 was noted during the attack of haemoglobinuria Some preliminary work on the haemolytic properties of atebirin *in vitro* is reported. A short discussion of the literature of malarial haemoglobinuria is also included N IV

LIVADAS (G) CANELLAKIS (A P) & VALAORAS (V G) Observations on Action of the Antimalaria Drugs in Greece.—*Riv di Malarologia Sez. I* 1938, Vol 17 No 4 pp 268-290 With 3 figs.

This is a careful record of the treatment of 112 cases of malaria in a mountainous village (population 900) in the north of the Peloponnesus The number of cases is small but the fact that the patients were kept under continuous observation for a long period of time gives value to the report The patients were divided into seven groups of about equal size the first three were treated with quinine the course of treatment lasting 7 10 and 20 days respectively One group was treated with atebirin one with plasmoquine one with atebirin followed by plasmoquine and one with quinoplasmin The doses given were those now generally recommended Atebrin displayed the quickest effect upon fever plasmoquine alone was the least efficient as a febrifuge Quinoplasmin was the most active in the reduction of splenomegaly Atebrin caused the disappearance of schizonts from the blood rather more rapidly than any other treatment The gametocytes

of *malarias* were more resistant to treatment than were those of *ruox*. Plasmoquine alone among the remedies used destroyed *falciparum* gametocytes. Quinine was more effective than the synthetic remedies in causing an increase in red cells and in their haemoglobin content. Quinoplasmin was most effective in preventing relapse. The conclusion is reached that the combination of atebirin and plasmoquine and more especially the combination of quinine and plasmoquine have special advantages in the general treatment of malaria. N W

CHOREMIS (H.) & SPILIOPOULOS (G.) Paralytische Erscheinungen nach Gebrauch von synthetischen Antimalaria Mitteln. [Paralytic Manifestations following Administration of Antimalarial Synthetic Drugs].—*Deut Med Woch* 1938 Nov 18. Vol. 64 No 47 pp 1680-1682.

The author first describes the case of a child aged 3 years who suffered from benign tertian malaria for which he was given four intramuscular injections of quinine this was followed by two intramuscular injections of atebirin 0.1 gm daily after an interval of a day he received on the first day 2 tablets of plasmoquine simplex, 0.01 gm. in each on the second day half a tablet was given.

Two days after the taking of plasmoquine there occurred obstinate vomiting with aphonia and difficulty of swallowing marked exhaustion and atony of muscles, especially of the lower extremities. The aphonia and difficulty of swallowing disappeared in 2 days but the muscular atony lasted for 14 days. Later as he had still enlargement of the spleen and fever atebirin was again administered with the result that the same symptoms again developed aphonia difficulty of swallowing and general muscular atony the symptoms appeared to be due to paralysis of the laryngeal musculature.

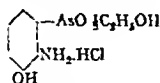
In another case of a child of 1½ years paralytic symptoms followed a 5-day course of atebirin 0.1 gm. daily *per os* the larynx was affected and there was aphonia and difficulty in swallowing. In three other children there developed symptoms of peripheral neuritis following administration of atebirin *per os*. In two others paralysis of the lower extremities followed administration of atebirin *per os* 0.1 gm twice daily in one 8 days after taking the atebirin and in the other 10 days. In two other children following administration of plasmoquine simplex, 0.01 gm. daily for 8 days in one case and 7 days in the other symptoms of paralysis of the laryngeal muscles and the muscles of the lower extremities occurred in the respective cases.

The author concludes from a consideration of these cases that the valuable antimalarial synthetic drugs, atebirin and plasmoquine are neurotropic. Hence it is very important that a course should not exceed 5 days. Further persons suffering from malarial cachexia should receive smaller doses than those usually prescribed, and, if possible a course of one of the vitamin B preparations should be combined with them. E D W Gray

GOLDMAN (Douglas) The Use of Mapharsen in the Treatment of Malaria.—*Amer J Med Sci* 1938. Oct Vol. 196. No 4 pp 502-509 With 3 figs.

Mapharsen is a recently introduced arsenated benzene compound for the treatment of syphilis. It is thought to be the effective breakdown

product of the arsphenamines in the body. Its composition is meta-amino parahydroxy phenyl arsine oxide —



It is administered intravenously, the dose being from 0.04 to 0.06 gm according to the patient's weight. Injections may be repeated at intervals of from 5 to 7 days. The patient should be fasting. Information is given concerning 24 patients who had been treated with malaria therapy and who subsequently received mapharsen injections: eight temperature charts are produced. One case of naturally acquired malaria was also treated with the drug. All were cases of *vivax* infection. The results were strikingly good. Parasites disappear almost immediately after an injection: after 24 hours it is only rarely that a disintegrating parasite can be found in blood smears. Splenomegaly begins to disappear almost as rapidly. The timing of the injection determines the occurrence or non-occurrence of a further febrile attack after treatment. If a chill be due in less than 24 hours after injection it usually occurs; if not or if the injection be given at the height of a chill subsequent febrile attacks are eliminated. The author considers mapharsen to be the drug of choice in the treatment of malaria: it is immeasurably more effective than quinine, certainly as effective as atabrin; it is easy to administer and safe to use. It is much less toxic to debilitated patients than is neoarsphenamine or even quinine. A case of malaria associated with severe leucopenia responded favourably and with an increase of leucocytes. Recurrences after mapharsen treatment are stated to be rare. No opportunity occurred for testing the value of the drug in the treatment of *falciparum* infections.

N IV

NIYEN (J. C.) Sulphanilamide in the Treatment of Malaria.—*Trans Roy Soc Trop Med & Hyg* 1938 Nov 26 Vol. 32, No 3 pp 413-418 With 6 graphs

Eighty unselected cases of acute malaria were treated in Kuala Lumpur with sulphanilamide. Of these cases 34 were *falciparum* infections, 38 *vivax* and 8 *malariae*. As a control 68 cases (30 *falciparum* and 38 *vivax*) were treated with quinine. All patients were kept under observation for at least 7 days; parasite counts were made daily by Sinton's method. A red and white blood cell count, differential count, and Arneth index estimation were done at the beginning and end of the course of treatment. All patients were Chinese or Indians of the labouring class. The sulphanilamide used was prontosil album (Bayer) 3 grams a day in two doses for 7 days. To the controls quinine bihydrochloride in solution was given daily for 7 days, the dose being 2 gm. per 100 lb. body weight.

It was found that prontosil abolishes fever and parasites in the majority of cases of *falciparum* malaria but is not so efficient as quinine: in 5 cases parasites were still present at the end of the course. In *vivax* cases prontosil is still less efficient: parasites were present in the blood of 15 patients at the end of treatment and two still had fever. Prontosil

was not an efficient remedy for the 8 cases of *malariae* infection. Mosquitoes fed on four crescent carriers at the end of treatment were readily infected. The author concludes that prontosil is much less efficient than quinine is more dangerous (no toxic effects were observed, however in this series of cases) and is much more costly [See also this Bulletin 1938 Vol 35 pp 561 562, 566.] N IV

SORLEY (E. R.) & CURRIE (J. G.) Notes on the Experimental Use of Prontosil Album in the Treatment of Malaria.—*Jl Roy Nav Med Serv* 1938. Oct. Vol. 24 No 4 pp 322-325

Ten cases of *vivax* malaria in Asiatic labourers were treated with prontosil album, ten grams three times a day for four days. The drug caused rapid alleviation of the patients' symptoms, more marked than is obtained with other anti-malaria drugs. In some cases parasites persisted in the peripheral blood. Three of the cases relapsed soon after the prontosil treatment. The authors recommend that the prontosil treatment be followed by a five days course of treatment with atabrin N IV

PIZZILLO (Giuseppe) Riattivazioni da rimpatrio in malarici reduci dall'A O I. (Reactivation of Malaria among the Repatriated from Italian East Africa.)—*Riforma Med* 1938. Oct. 8 Vol 54 No 40 pp 1523-1525 [13 refs]

The author discusses the time necessary for the spontaneous, or climatic cure of malaria, in patients who have removed to a non-malarial locality and quotes the opinions of several authorities. A study was made of 200 case cards of malaria patients who were repatriated from Italian East Africa. Reactivation of the malaria parasite in such persons may be either early normal or late. In this and in other respects the reactivation is similar to that produced by intravenous adrenalin therapy. Much stress is laid upon the substantial identity of the mechanism of action of Ascoli's treatment and of natural climatic therapy. Ascoli's treatment offers certain advantages: it can be carried out anywhere and by it the patient can be more rapidly restored to health than he can by nature unaided. N IV

PIZZILLO (Giuseppe) Sulla cura di Maurizio Ascoli nelle infezioni malariche. Nota 4. I. Ulteriori ricerche sulle riattivazioni. (Reactivation of Malaria during and after Ascoli's Treatment.)—*Riv di Malarologia* Ser I 1938 Vol 17 No 4 pp 281-294 German summary

The author discusses the reactivation of the malaria parasite that is associated with Ascoli's treatment with special reference to the febrile attacks that are occasionally experienced after the conclusion of treatment. In 5 per cent of the chronic cases of malaria which have undergone the complete course of treatment without febrile manifestations signs of reactivation of the malaria parasite are met with during the first week following the completion of treatment. In chronic or recent infections with a greater tendency to relapse such post-treatment reactivations are encountered in 20 per cent of cases in the first week after treatment in 12 per cent in the two successive weeks. In recent infections reactivation occurs in the fourth, fifth or sixth week.

or even later in 7 to 9 per cent of cases. These late post treatment febrile manifestations differ from malarial relapses inasmuch as recovery is spontaneous without the administration of quinine or other specific remedy there is at the worst only slight and transitory splenic enlargement and they have little or no ill effect on the general condition of the patient or on the blood. The interval that elapses between the end of treatment and these attacks varies inversely with the duration of infection. N IV

SINTON (J. A.) HUTTON (E. L.) & SHUTE (P. G.) Unsuccessful Attempts at Causal Prophylaxis with Certuna in Malignant Tertian Malaria.—*Trans Roy Soc Trop Med & Hyg* 1938 Nov 26 Vol. 32. No 3 pp 419-422.

Certuna, originally called Cilonal [see also this *Bulletin* 1938 Vol. 35 pp 562 563 564] is a product of Bayer's Elberfeld laboratories it is a dialkylamino-oxyquinolylaminobutane. It has been shown to have a destructive action on *falciparum* gametocytes. The experiments described in this paper were designed to test the potentialities of Certuna as a true causal prophylactic of *falciparum* malaria.

A batch of *A. maculipennis* var *atroparvus* was infected with a Rumanian strain of *P. falciparum*.

One patient was bitten by five infected mosquitoes 25 minutes after receiving a dose of 0.06 gm. of Certuna. He received 0.02 gm. thrice daily for the next 6 days. Fever started on the 12th day following the bites and parasites were detected the following day.

The second patient received similar treatment except that the initial dose of Certuna was given 45 minutes before 160 000 sporozoites in Locke's fluid were injected. Fever started on the 7th day and parasites were found in a thin film, on the 10th day.

In a third case three doses of 0.02 gm. were given the day before and 0.06 gm. 25 minutes before the patient was bitten by 7 mosquitoes. The drug was given for the succeeding 5 days 0.06 gm. a day. Fever appeared on the 10th day and parasites on the 11th day.

In two further cases doses of 0.04 gm. and 0.06 gm. thrice daily for 7 days were unable to prevent the development of infection.

The drug was well tolerated but it failed in all five cases to prevent infection. The dosage of sporozoites was greater than is usually acquired in nature. N IV

VERSLAGEN EN MEDEDEELINGEN BETREFFENDE DE VOLKSGEZONDHEID 1938 July 26 pp.—Verslag over de jaren 1936 en 1937 van de malaria-commissie uit den Gezondheidsraad [SCHÜFFNER (W. A. P.) Chairman] [Report of the Malaria Commission of the Council of Public Health for 1936 and 1937]

There is much close discussion in this report on questions of importance in the field campaign against malaria. Some of it has been presented in various publications. The most instructive of the headings in the report are (1) Therapeutic measures. (2) Destruction of adult mosquitoes as an antimalarial measure. (3) Abolition of the breeding places of *Anopheles maculipennis atroparvus*.

(1) *Therapeutic measures*—Most of the observations here recorded relate to the prevention of relapses and the development of the so-called healthy parasite carrier. In this respect atabrin does not seem

to have been particularly satisfactory. Plasmoquine on the other hand, used as a 14-day cure, was efficacious in preventing relapses. A 14-day treatment however of all malaria sufferers did not make much impression on the infection rate of Anopheles. As a really satisfactory method of relapse prevention the Commission commended heartily the 3-week plasmoquine cure of SRETOW. Their final conclusion on this subject is a negative one. A therapeutic malarial campaign in Holland while not exactly impossible is under present conditions not practical.

(2) *Destruction of Adult Mosquitoes* — Theoretical considerations form the basis of this antimalarial measure. KORTEWEG maintained that a portion of the sufferers from malaria in a given year have received their infection in the previous autumn on the grounds that — (1) infected Anopheles are only found in late summer and autumn and almost exclusively in dwellings. (2) individuals infected as a test in autumn developed malaria in the following spring and summer. It is not all species of *maculipennis* however which participate, in Holland, in this autumn infection. Only *A. maculipennis atroparvus* in spite of beginning sexual inactivity continues to suck human blood in late summer. *A. maculipennis merrisi* whose egg-laying ceases during August, ceases also to suck blood. If then it is asked, all infected anopheles in human dwellings are killed off in late summer and autumn will all malaria be prevented and if not what malaria is to be expected in the following year? KORTEWEG would answer the question — Those cases of primary malaria which manifest themselves before the 1st May would be prevented. The house-spraying which was the method to be adopted for killing off infected Anopheles did not require to be applied altogether indiscriminately. Certain facts were taken into account — (1) Anopheles infection in late summer and autumn is restricted to a comparatively small number of houses which become centres of infection. (2) From these centres anopheles spread infection up to the end of October to neighbouring houses within a radius of not more than 100 metres. (3) About 4/5 of the persons who in a given year suffer from malaria live at most 100 metres distant from a centre of infection, which had existed in the previous summer and autumn. It was therefore the expectation of the Commission that killing of all Anopheles in late summer and autumn, in the village of Uitgeest for example should reduce its malaria of the following year to one-fifth of its ordinary frequency. A spraying campaign took place in 1936 and it was found that — (1) In a house that had been sprayed with the insecticide Shelltox not only were all Anopheles killed, but the house remained for 14 days thereafter less attractive for Anopheles. The quantity used was abundant amounting to 0.4–0.5 litres per house per treatment this is 5 to 6 times as much as is reckoned (0.08 litre) necessary for killing the Anopheles in a house. (2) After the spraying at the end of August the Anopheles were again numerous 3 weeks later in the treated house. Even after the 2nd and 3rd treatment in the middle of September and beginning of October mosquitoes returned, although now in small numbers. Strict avoidance of the possibility of infection required that sprayings succeeded each other every 14 days. The facts regarding malaria in Uitgeest are given as — (1) There were 343 primary cases in 1936 and 71 relapses from 1935. (2) In 1937 however there were only 31 primary cases and 25 relapses. The result may be regarded as satisfactory but although *Anopheles maculipennis atroparvus* is to be accepted as the most important vector of malaria in

North Holland the method of killing off this mosquito by spraying in autumn is considered somewhat costly for general adoption.

(3) *Abolition of breeding-places of A. maculipennis atroparvus*—It has been demonstrated that the density of the larvae of *A. maculipennis atroparvus* in water with salt content of 1500 mgm Cl per litre or higher is as much as twelve times that in water of 500 mgm. Cl per litre. The suggestion is made that as the IJsselmeer changes from salt water to sweet water the consequence will be the disappearance there of the breeding places of the malaria carrying mosquito.

W F Harvey

STROTHER SMITH (F F) Anti-Mosquito Measures in Cantonments with Special Reference to "Dry Day" instituted in 1927—*Indian Med Gaz* 1938, Oct. Vol. 73 No 10 pp 606-608.

On one day a week in certain cantonments in Northern India all water receptacles must be empty from 8 a.m. to 9 a.m. Such receptacles include animal water troughs garden tanks and irrigation ditches in gardens small pits and bullock runs from wells etc. Fire buckets are emptied and immediately refilled. The edges of larger collections of water which cannot be emptied are kept free from grass and undergrowth. Such measures if rigidly enforced and carried out throughout the mosquito breeding season result in a markedly diminished prevalence of mosquitoes. Details of the special inspection staff employed are given. The author is experimenting with success with a spraying machine called the phantomyst for the destruction of adult mosquitoes. The cubicide used is a 3 per cent. solution of Lethane in kerosene oil. The machine produces a fine mist which penetrates well and is very economical. Five minutes spraying with a large model only consumes one ounce of fluid.

N W

MICHELSON (E G) An Apparatus for Continuous Oiling of Streams.—*Indian Med Ga.* 1938, Oct. Vol. 73 No. 10 p 612. With 1 fig.

Oil screens are commonly used on small slow running streams in Assam. These are effective but sudden storms may sweep away all the oil. To obviate this the author describes a simple device. Two quart tins are securely wired one to each supporting upright of the screen just above high water level. Two pieces of wick $2\frac{1}{4}$ inches wide of double thickness have one end immersed in the tin where it is kept in place by a weight and the other stitched to the gunny or canvas of the screen. The gunny of the screen is wide enough to allow for rising water. The tins are filled with oil. A piece of wire prevents the wick resting against the outside of the tin and thus wasting oil. One quart of oil will give a continuous coating to the stream for eight days. Screens should be spaced about 130 yards apart but this distance varies with the configuration of the stream. The even flow of oil is unaffected by spates.

N W

KING (W V) Experiments with Phenothiazine and Mosquito Larvae.—*Jl Econom. Entom* 1938 Oct. Vol. 31 No 5 pp 610-611

A solution consisting of 1 gm. phenothiazine in 20 cc. of sulphonated petroleum oil and 5 cc. of acetone was found to be an efficient *Culex* larvicide in laboratory conditions. The solution is mixed with water

before evaporation of the acetone occurs. The phenothiazine was fatally toxic to *Culex* larvae in dilutions of one in two million. Much more experimental work is required to determine whether this larvicide has a field of usefulness in practical anti-mosquito work. N IV

BRUMPT (E.) Fréquence et origine des Black Spores de Ross au cours de l'infection des stégomyies par le *Plasmodium gallinaceum*. [Frequency and Origin of Ross's "Black Spores" in *Stegomyia* infected with *Plasmodium gallinaceum*.—Ann. Parasit. Humains et Comparés 1938, May 1 Vol 16, No. 3 pp 220-241 With 2 figs. & 4 plates [34 refs]

In this article the author discusses the various theories which have been advanced as to the nature of the black spores which were first described by Ronald Ross in 1898 on the stomachs of mosquitoes infected with the bird malarial parasite. More recently REICHENOW (1932) found them in all of twelve *Theobaldia annulata* infected with the bird parasite *Plasmodium circumflexum*. In his work on the development of the fowl parasite *P. gallinaceum* in *Stegomyia fasciata* and *S. albopicta* the author has encountered black spores in 6 to 7.5 per cent of a large number of these mosquitoes fed once or twice on infected fowls. He does not agree that they represent resistant spores, or that they are instances of hyperparasitism or as maintained by Bruce MAYNE that they are derived from the smallest branches of the tracheal system. It is clear that foreign bodies either parasitic or not in the tissues of mosquitoes are liable to undergo chitinization and malarial oocysts in various stages of development and sporozoites are no exception to this rule. When the groups of black spores, rounded bodies or the more typical banana-shaped structures are of the size of malarial oocysts it may be concluded that they have been formed by the chitinization of oocyst contents. A similar chitinization of sporozoites which have been scattered through the body after rupture of mature oocysts may take place. In either case the banana-shaped black spores are considerably larger than individual sporozoites, so that it would appear that the deposit of chitin has occurred around a group of sporozoites rather than on a single one. Chitinous masses which are larger than malarial oocysts have probably been derived from other extraneous bodies. As an illustration of this FULLERON'S observation of a chitinized microfilaria (*F. repens*) in a Malpighian tube of *Anopheles maculipennis* is quoted.

In this study the author has never found black spores in mosquitoes which had been fed on uninfected fowls or on birds infected with the parasites which do not develop in the mosquitoes used. It can be accepted therefore that the presence of black spores of the type so frequently associated with malarial infections is an indication that malarial infection of the mosquito has occurred.

The paper is illustrated by text figures and four excellent plates depicting the various types of black spores encountered. C M W

COGGERHALL (Lowell T.) & EATON (Monroe D.) The Complement Fixation Reaction in Monkey Malaria.—Jl. Experim. Med. 1938, June 1 Vol. 67 No. 6 pp. 671-682. With 6 figs. [13 refs]

From the blood of infected monkeys or from the spleens in cases of intense infections antigens can be prepared which give a positive

complement fixation reaction with the serum of infected animals. The antigen must be liberated from the parasites either by freezing drying and grinding or by prolonged autolysis after which it is extractable by normal saline solution. Complement fixation substances appear in the blood of infected monkeys early in the infection. After the acute phase has been passed over by the use of quinine or immune serum there is a rise in titre followed by a fall. During the chronic phases there is a rise in titre after relapses. As regards the production of antibodies there is a marked variation amongst different animals some producing very little, others a considerable amount. It was noted sometimes that animals which produced large amounts of the protective antibodies previously described were bad producers of complement fixing antibodies. From this it would appear that the two antibodies differ from one another. In view of its failure to be extracted by lipid solvents and its destruction by tryptic digestion it would seem that the complement fixing antibody is of a protein nature. C M IV

EATON (Monroe D) The Agglutination of *Plasmodium knowlesi* by Immune Serum.—*Jl Experim Med* 1938 June 1 Vol 67 No 6 pp 857-870 With 4 figs on 2 plates [15 refs.]

The author has tested the serum of monkeys infected with *Plasmodium knowlesi* for the presence of agglutinins against these parasites. He has shown that such agglutinins appear in the serum of monkeys between the 15th and 45th days of an infection and that the titre rises as the infection subsides. The agglutination brought about by acting on infected red cells or on parasites liberated from haemolysed infected red cells can be recognized both macroscopically and microscopically. It is only the mature parasites which are involved in this agglutination. The sera of animals which have been superinfected a number of times may give agglutination at a dilution of 1:1000. The reaction is specific as the sera of normal monkeys or monkeys infected with other species of malarial parasite are quite inactive. C M IV

COGGESHALL (Lowell T) & EATON (Monroe D) The Quantitative Relationship between Immune Serum and Infective Dose of Parasites as demonstrated by the Protection Test in Monkey Malaria.—*Jl Experim Med* 1938 July 1 Vol 68 No 1 Pt 1 pp 29-38

It is shown that the minimal number of parasites required to produce *Plasmodium knowlesi* infections in *rhesus* monkeys is 1 to 10. The interval between the injection of parasites and their appearance in the peripheral blood varies with the number of parasites injected but the interval between the appearance of parasites and the death of the animal is unaffected by the dose. The severity of the infection is the same whether the infecting dose is small or large (1 or 100 000 parasites). Protective serum from chronically infected monkeys will protect against death if administered at the time of the injection of parasites and daily afterwards. There is moreover a definite relationship between the quantity of serum required to effect the protection and the dose of parasites injected. If before the parasites are injected they are incubated with immune serum for half an hour at 37°C. In some cases when the number of injected parasites was small the half hour's

incubation with immune serum, if relatively large in amount, resulted in the death of all the parasites, for their injection failed to produce infection
C M IV

COGGESHALL (Lowell T) & KUMAR (Henry W) Effect of Repeated Superinfection upon the Potency of Immune Serum of Monkeys harboring Chronic Infections of *Plasmodium knowlesi* — II
Experim Med 1939 July 1 Vol 68 No. 1 Pt 1 pp. 17-27
With 2 charts

The authors have already shown that the pooled blood from a group of monkeys in the chronic stage of a *Plasmodium knowlesi* infection contains antibodies which are able to diminish the effect of this parasite on newly inoculated monkeys to the extent that they are saved from death. The antibody content of the pooled bloods must be low as large amounts of the serum are required to bring about the protection referred to. In the present paper it is shown that if the chronically infected monkeys are superinfected seven times during the course of two months the antibody content of the pooled blood is considerably higher less serum being required to effect protection. If on the other hand, further superinfections are carried out, the antibody content diminishes owing it is assumed to the absorption of antibody by the large number of parasites injected
C M IV

MISCELLANEOUS

NYASALAND PROTECTORATE ANNUAL MEDICAL & SANITARY REPORT
FOR YEAR ENDING 31ST DECEMBER 1937 Appendix IV 27 pp —
Nutritional Review of the Natives of Nyasaland. Preface by A D
J B WILLIAMS, O.B.E. Chairman Native Welfare Committee
[Summary appears also in *Bulletin of Hygiene*]

This review contains a mass of clearly displayed information and is of special importance in that it appears to be the first nutritional study made of the natives of Nyasaland. The main part of the survey reviews the present conditions of nutrition in Nyasaland and deals with prison hospital and school dietaries labour conditions and dietaries cost of food nature of diet and dietary habits of the general population related agricultural conditions and problems deficiency diseases etc. This is followed by a review of further studies and researches which appear desirable with an analysis of foodstuffs an anthropological and nutritional survey and an investigation of the fishing resources of Lake Nyasa. Then follow reviews of practical measures which have been taken in the past to apply scientific knowledge to the improvement of nutrition and of further measures which it appears desirable to take in the future and of the consequences which improvements in nutrition may have on the economy of the Dependency. Other sections give the various questionnaires which were sent out for preparing the Report and a list of edible wild plants in Nyasaland. [So much material is contained in this short appendix that it is impossible to condense and summarize it adequately and the review should be read in full by all who are interested in the nutritional problems of native peoples.]

Douglas C Harrison

TEICHLER (G) Einige Besonderheiten bei ostafrikanischen Eingeborenen [Medical Observations among East African Natives].—*Arch f Schiffs u Trop Hyg* 1938. Sept. Vol. 42. No. 9 pp 421-427 With 5 figs

The author who writes from Mnyusi in Tanganyika Territory is in medical charge of sisal plantations. The labourers about 1,500 come from a variety of tribes as far away as Rhodesia and Mozambique. Malaria is severe in those from the highlands and may simulate epidemic meningitis. On Lake Victoria he saw several cases of anal stricture in women. All gave a positive Frei reaction. In other cases there was enlargement and induration of the labia and stricture of the vagina and in men hard swellings in the groin-glands region.

A case of firm growths in the nostrils regarded as yaws was shown microscopically to be one of rhinoscleroma. The vitamin question is acute and under careful study by the Administration. Prescurvatic symptoms—feebleness pallor palpitation, fatigue vulnerability (in the literal sense)—are not rare but the author has not seen true scurvy. Patients from Lake Tanganyika with anaemia and swollen feet are common. Hookworm is suspected but is rarely found and these patients bear drugs badly especially carbon tetrachloride. Salvarsan also is ill borne and a case of salvarsan rash is figured. A frequent symptom in these natives is night blindness coming on 2-3 months after they have left the interior. It is attributed to a lack of vitamin C. The author finds that the native diet at home and in the plantations varies little

and in the plantations includes more meat. The single difference seems to be the beer which they drink freely at home but in the plantations only on Saturday and Sunday. However he seems to doubt the adequacy of this as a cause of avitaminosis. [Do the plantation labourers cook their food themselves or is it overcooked for them?] He advises the regular administration of palm oil as a furnisher of vitamins A and C.

The rest of the paper is given to a discussion of Gillian's oedema with details of cases. The conclusion is that this is not a disease *suu generis* but has various causes among which malaria is prominent.

A. G. Baghurst

CONGO BELGE. Fonds Reine Elisabeth pour l'Assistance Médicale aux Indigènes du Congo Belge. Rapport annuel 1937. [The Foréami Service in the Belgian Congo. Report for 1937].—104 pp. With 2 figs. & 2 maps (1 folding). Bruxelles. 112 Rue du Commerce.

The 1937 annual report of the Foréami institution shows that the activities have been extended to cover two-thirds of the Kwango area. The organization is briefly described and it is again explained that the object is the repeated examination of the natives in their natural surroundings and the treatment of all individuals requiring it. The medical and sanitary staff have contributed 652 working months during the year [which corresponds to about 46 persons working for the whole time. More than half of these are doctors]. The native staff numbers 521 persons, and the number of persons medically assisted has now passed 900 000. Almost the whole of the population of Kwango have been provided with medical certificates. These figures give an idea of the magnitude of the undertaking.

Brief details are given of the various diseases treated, of which the chief were—10,258 cases of trypanosomiasis with 5101 cures [this section of the report will be abstracted elsewhere in this *Bulletin*], 3,628 of yaws, 2,045 of leprosy, 3,943 of ulcer and 52,542 of helminthiasis. Surgical operations numbered 376.

The social services include maternity and child welfare and village sanitation. A section on the demography of Kwango is included, and a list of the publications of the members of the staff is given. [See also this *Bulletin* 1935 Vol. 32, p. 501.] C IV

LEDENT (G.) & PILTIER (M.) Les maladies transmissibles observées dans les colonies françaises et territoires sous mandat pendant l'année 1935. [Transmissible Diseases in the French Colonies and Mandated Territories in 1935].—*Ann. de Méd. et de Pharm. Colon.* 1937. July-Aug.-Sept. & Oct.-Nov.-Dec. Vol. 35. Nos 3 & 4. pp. 748-928. 1207-1335. With 3 maps.

This Report covers a very wide field and it is only possible to indicate some of its contents. Its interest is lessened too owing to its late appearance.

It is arranged under Disease headings, each disease being considered in turn, as it occurs in the French colonies all round the world. First come the "pestilences"—plague, cholera, yellow fever, smallpox, typhus, then the endemo-epidemic diseases—malaria and blackwater trypano- zoon, dysentery, relapsing fever, intestinal parasitism, schistosomiasis, filariasis, dengue, beriberi, yaws, tropical ulcer. [We should exclude beriberi from this category.]

A few points of general interest or unfamiliar to the reviewer will be noted. Under plague in Senegal—among defensive measures against rats it is recommended to keep a zone round each village clear of cultivation but mamoc may be tolerated because the soil remains clean and easy of surveillance burrows can be promptly detected and fumigated and the rat never attacks the roots below ground.

Under yellow fever—of 14 cases in Africa (2 suspected) one was labelled acute ascending myelitis and there was no suspicion of yellow fever in life its nature was revealed by liver examination post mortem. Two of the subjects contracted infection in the bush which raises the question of jungle yellow fever. The evidence of malaria in Madagascar was noteworthy. Of 787 000 consultations in 646 000 or 80 per cent. this was the diagnosis and 10 000 were admitted to hospital. In Réunion Is. which was malaria free before 1869 half the consultations were for malaria. The D M S reports that the major cause is deforestation on high ground with consequent erosion of soil and obstruction of the beds of the rivers.

Under bilharziasis in Cameroon it is noted that 74 per cent. of infections were in boys between 5 and 15 years and 45 per cent. in girls after the introduction in the Chad area of shower baths in several schools, as a substitute for river bathing the incidence of infection fell. The trypanosomiasis section is a full one with many tables and sketch maps.

Diseases common to France and the tropics are treated in the second fascicle and a fourth category social diseases which includes leprosy. These do not call for comment.

A G. Bagshawe

COLONIAL OFFICE Pitcairn Island. General Administrative Report and Medical Report. (Colonial No 165)—79 pp. 1938. London H.M.S.O. [1s. 3d.] [Medical Report by Duncan COOK, M.D. M.R.C.P. D.P.H. pp. 52-79. With 1 chart.]

The chief interest of this Report lies in the record that since 1858 while other Pacific populations were decreasing that of Pitcairn Island has grown from 16 to 209 and that though the diet does not include milk or butter and eggs and green leafy foods are relatively scarce apart from the early loss of teeth the people are strong and healthy.

The Report is based on enquiries made during 39 days residence in May-June, 1937. Pitcairn which lies at Lat. 25-4 S. on the route between the Panama Canal and New Zealand was colonized in 1780 by nine mutineers from the *Bounty* making with their Tahitian wives and other natives 28 souls.

In 1858 192 persons were at their own request removed to Norfolk Island but some returned. In 1864 there were 45 in Pitcairn and in 1936 209 all but nine descendants of the mutineers. The causes of this remarkable increase appear to be the isolation of the island almost complete till the opening of the Panama Canal in 1914 combined with the difficulty of landing and the consequent short stay of ships the freedom from social and economic prejudice of the half-caste islanders and the predominantly European culture which protected them from venereal disease and alcohol. For 100 years the islanders have been Seventh Day Adventists and apparently strict ones. The climate is good diseases are few and inbreeding has had no harmful effects.

Of the 200 population 110 are males and between 16 and 45 years the male preponderance is 16

It is noted that "daybiting mosquitoes breed freely in the rain-water cisterns, flies are almost unknown. Semi-wild goats roam the island and are shot for food but their milk is not used. Chickens are plentiful but are preyed on by the numerous rats. Fruits are of many kinds and are abundant. Shortage of animal food is now compensated by the importation of tinned meats. The diet seems to be both chemically and mechanically inadequate. [This mechanical inadequacy apparently refers to shortage of roughage.]

Almost the whole population was medically examined. They appeared to be of average intelligence and physically very strong. The absence in children of enlarged tonsils and adenoids was noted. The front teeth are nearly always lost and few islanders reach the age of twenty without requiring a complete or partial denture. Faeces were examined for hookworm ova without success. Schick, Dick and Mantoux tests showed 50 per cent. Schick positive, 50 per cent. Dick positive and 20 per cent. tuberculin positive. no comment is made on these results.

The author recommends that a medical officer from New Zealand should reside 10-14 days on the island every 2-3 years and that an island girl should be trained to be a Public Health Nurse. A. G. Bagshaw

JERACE (F) La colorazione alla Romanowsky con il liquido di Puntoni. ["Romanowsky" Staining with Puntoni's Fluid].—*Ann. d'Igiene*, 1938. Sept.-Oct. Vol. 48. No. 9-10. pp 606-607

The fluid is made up as follows —

Azur	5 gm
Methylene blue	2.5 gm.
Eosin A.B. extra (Gibbler)	2.5 gm.

These are ground together thoroughly in a glass mortar and added to 500 cc. of pure neutral glycerine. To this is added 500 cc. pure methyl alcohol and the mixture is shaken gently and kept at 37°C for 24 to 48 hours. It is then decanted or filtered and preserved in a yellow bottle with a ground stopper. This stain is used in the same way as Giemsa's stain, but gives better results in demonstrating basophil elements. C. H.

PAMPANA (E. J.) Colorazione dei preparati a goccia spessa demoglobulinizzazione con soluzioni isotoniche. [Haemolysis with Isotonic Solution in the staining of Thick Drop Preparations].—*Riv. di Malariologia* Sez. I 1938. Vol. 17. No. 4. pp 300-304. English summary (8 lines)

The author found that thick drop blood films could be haemolysed by solutions of NaCl in concentrations up to 10 per 1 000. Evidently dried blood in this respect differs from fresh blood. The advantage of using an isotonic solution is that distortion of cells and parasites does not occur and a colourless background is produced. It is better however to use an isotonic buffered solution, made up as follows —

Na_2HPO_4	14.824 gm
KH_2PO_4	5.33 gm
Distilled water	... 1 litre.

This maintains a pH of 7.2

The method is to dilute 1 cc of Giemsa stain with 19 cc of this solution stain for 20 minutes wash rapidly in distilled water and allow to dry. If a precipitate forms in the water after the addition of the two salts, it should be left for a few days and then filtered. It is then fit for use. C II

JACKSON (R B) The Taking of Microphotographs with the Aid of a Simple and Inexpensive Apparatus.—*Chinese Med J* 1938 Oct Vol 54 No 4 pp 367-371 With 13 figs.

A Metron Reflex Drawing outfit obtained from Messrs C Baker, 224 High Holborn London to which is fitted a microscope is enclosed in a box as shown in the figure. To the box is fitted a camera which takes plates. When the plate holder is removed an image can be projected on to a negative placed in the movable frame I J. The procedure is carried out in a dark room.

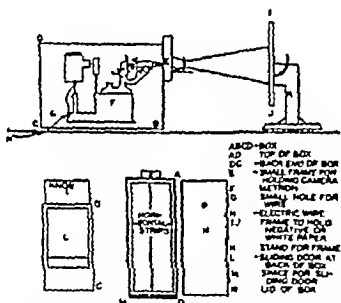


Diagram illustrating details of the box and movable glass frame used in taking microphotographs

(Reproduced from the *Chinese Medical Journal*)

The image is focussed by manipulating the microscope and camera, on to white paper in the frame by the aid of the red light of the dark room. A negative is then substituted for the paper the Metron lamp is switched on and an exposure made by means of the camera shutter.

Excellent microphotographs taken in this way are used to illustrate the article. The price of the Metron outfit (without microscope) is given as £8 2s 6d. C II

BRIESE (Reinhold R.) & COUCH (James F) Preservation of Cyanogenetic Plants for Chemical Analysis.—*J Agric Res* 1938 July 15 Vol 57 No 2 pp 81-107 With 2 figs. [31 refs]

A considerable number of tropical plants are cyanogenetic that is they contain substances which on addition of water give rise to the

formation of hydrogen cyanide. It is important if analysis of them is to be at all accurate that some method of preserving them should be found which does not materially change this property especially under circumstances where they have to be sent to a distant laboratory. It must be remembered also that the rate of formation of HCN in cyanogenetic plants is not uniform. It begins to fall in 8-10 hours and several hours (10-12) elapse before this first level is again reached.

From their investigations of a number of specimens shipped to them in the fresh state and dried, and in preservatives the authors have found that fresh plants stored at ordinary temperatures without preservatives lose in 1 to 6 days up to as much as 83 per cent. of the HCN. If they are stored at refrigerator temperature the loss on maceration is great. 67 per cent. may be lost when fresh plants are kept in water to which chloroform has been added, in other cases the loss may be but slight in four days. It is this irregularity which makes the method so uncertain. Acids cause a rapid loss, salicylic less than others. Alkalies cause a loss between 32 and 86 per cent. due to destruction of HCN rather than to inhibition of cyanogenesis. Only some 8 per cent. or less in a week is lost when alcohol is added from 10-25 per cent. but in 7-8 weeks 20 per cent. In high concentrations (50-85 per cent.) alcohol inhibited cyanogenesis.

The best preservative was aqueous solution of mercuric chloride added to the extent of 1 per cent. by weight for fresh plant. Such showed no loss after storage for as long as six months the optimum temperature for storage being 25°C. The article describes the technique for recovering HCN from samples so preserved. This is purely a chemical question and does not come within the scope of this *Bulletin*. Those interested in this aspect of the subject should consult the original.

H H S

EVANS (K. Leigh) & ARNOLD (L. E.) Experimental Studies of Poisoning with Ackee (*Blighia sapida*).—*Trans Roy Soc. Trop. Med. & Hyg.* 1938, Nov. 26. Vol. 32, No. 3, pp. 355-362. With 5 figs. on 1 plate.

This article indicates a big step towards the solution of the puzzling and fascinating problem of the toxic principle of the ackee (*Blighia sapida*). Thousands of lives have been lost by ackee poisoning in past years, as SCOTT showed in his monograph on the Vomiting Sickness of Jamaica, published in 1916. Since then deaths have been much fewer but until the actual toxic agent or constituent is known and, if possible, isolated and tests devised to prove its presence in the human subject, killing by its means will, as it has in the past, escape detection. Hence this work of Drs. Leigh Evans and Arnold has a great medico-legal as well as a clinical and academic scientific value.

After repeating and confirming the experimental work of SCOTT and of COVXAL and RALSTON carried out more than twenty years ago [see this *Bulletin* 1915 Vol. 6 p. 428, 1916, Vol. 7 p. 381, 1917 Vol. 10 p. 102, 1918, Vol. 12 p. 438] they have again demonstrated the peculiar fact that herbivorous animals require a much larger quantity of the fruit to kill them than do carnivores. Thus whereas 1 gm. per kilo will kill a kitten, guinea-pigs will survive doses under 3.5 gm. per kilo.

The details of their confirmatory work which was carried out with meticulous care and was essential to their pioneer investigations which

followed are given in this article and it is want of space only that compels us to leave this aspect of the subject. Those interested in toxicology would be well repaid by a study of it. The important advance which the authors have contributed is in separating the constituents—saponin, fat and phytosterol—from the fruit and in showing the toxicity of the first of these. That the toxic principle might very likely be a glucoside was suggested long ago by Scott but merely on the empirical and negative grounds that the poison could not be obtained from the gastric contents or tissues or excreta of fatal cases and he inferred therefore that the toxic agent was some substance rapidly decomposed or changed on absorption.

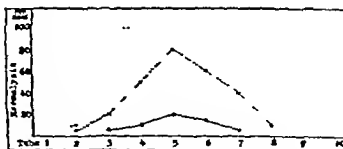
Drs. Leigh Evans and Arnold describe the method they employed for separating the saponin from the ackee extract prepared as for their preliminary animal experiments. Cases of ackee poisoning occur from November to March or even April but much more commonly from December to February or March and the authors have shown that in these the colder months of the year the saponin content is higher and the toxicity greater. They have demonstrated by carefully devised series of tests why the normal naturally opened ackee is harmless whereas the unopened fruit is highly toxic. The following tables taken from their article show these points more clearly than a long description —

TABLE II
Haemolysis Dilutions

Tube number	1	2	3	4	5	6	7	8	9	10
Blood suspension cc.	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Saline cc.	2.95	2.9	2.8	2.7	2.6	2.5	2.25	2.0	1.75	1.5
Saline ackee extract cc.	0.05	0.1	0.2	0.3	0.4	0.5	0.75	1.0	1.25	1.5

TABLE III
*HAEMOLYSIS IN ACKEE
EXTRACTS*

Unopened ackee
Partly opened ackee embedded
seeds
Opened ackee
normal seeds



Graphical expression of the results of haemolysis tests on extracts of ackee.

[Reproduced from the *Transactions of the Royal Society of Tropical Medicine and Hygiene*]

1. The arillus of the unopened ackee is lethal to kittens with a dose of 1.0 grammes per 100 grammes of kitten weight when administered intragastrically.

2. The arillus of the unopened ackee is lethal to guineapigs when a dose of 3.5 grammes per 100 grammes of guineapig weight is given subcutaneously or intragastrically.

" 3. In the partly opened ackee the arillus with embedded seed is lethal to guinea-pigs in the same dose as the arillus from the unopened ackee while the arillus with normal seed is not lethal to guinea-pigs in this dosage.

" 4. This toxic property is cumulative when repeated sublethal doses are given at daily intervals.

" 5. The arillus of the fully opened ackee is not lethal to guinea-pigs.

6. The post-mortem findings, both in kittens and guinea-pigs, indicate an acute toxæmia affecting all organs with hæmorrhages and fatty changes, chiefly in the liver and kidneys.

7. The ackee contains a saponin, which is hæmolytic in some stages of the development of the fruit, and the toxic substance is very probably this saponin.

8. The saponin is strongly hæmolytic in the arillus of the unopened ackee less so in the arillus with embedded seed of the partly opened ackee being only slightly hæmolytic in those with normal seeds while it is non-hæmolytic in the arillus of the fully opened ackee.

9. The fat content of the arillus varies with the stage of development of the ackee. There is little fat in the unopened ackee, most in the arillus of the fully opened ackee. The arillus with the embedded seed contains less fat than the arillus with the normal seed in all stages of development.

" 10. The toxicity of the arillus of the ackee varies inversely with the fat (and phytosterol) content. This is as would be expected phytosterol fixing the saponin and rendering it non-hæmolytic and, as a consequence non-toxic.

" 11. There is apparently a seasonal variation in the toxicity and fat content of the ackee. In the colder months (December to March) the fruit contains less fat and is apparently more toxic than at other times.

12. The unavailability of herbivorous animals for this particular investigation is appreciated, but, even with this handicap the findings appear to open several avenues for further investigation. In view of the age and seasonal incidences, particularly in vomiting sickness, immunological studies and experiments are being conducted to determine what part, if any is played by photochemical and photodynamic action on the fat and phytosterol content and toxicity of the fruit."

(An admirable piece of work, which, it is hoped, will be followed to its logical conclusion—the finding of a test by which proof of poisoning by ackee may be established by definite chemical means and not merely as hitherto by the pathological and histological lesions produced.)

H H S

CURASSON (G.) *Etat actuel de nos connaissances sur les plantes toxiques de l'A.O.F.* [Present-day Knowledge of Poisonous Plants of French West Africa.]—*Bull. Comité d'Etudes Hist. et Scient. de l'A.O.F.* 1938. Apr.-June. Vol. 21. No. 2. pp. 149-173.

This is little more than a list of over a hundred plants regarded as poisonous in West Africa. A few words are added to each regarding its reputed toxicity. Most of them are known in other parts of the tropics. The information when correct, is too meagre to be of much use and in the case of *Blighia sapida* with which the reviewer is best acquainted, the statements that it "causes the vomiting sickness in America, that "only the fibrous part adhering to the seeds is toxic and that "the seeds are sometimes eaten roasted by Europeans" are at variance with fact and the only other point mentioned, that the "powdered fruit is used for stupefying fish in the Gold Coast" is, to say the least, doubtful.

H H S

EARLE (H. Vigors) Toxic Effects of *Hippomane mancinella*.—*Trans Roy Soc Trop Med & Hyg* 1938 Nov 26 Vol 32. No 3 pp 363-370 With 2 plates. [20 refs.]

Hippomane mancinella the manchineel tree is found in the West Indies and along the coast of Central and South America. All parts of the plant are toxic raindrops falling on a person sheltering beneath it will cause irritation and the fruit somewhat like an apple is inadvertently eaten by new arrivals, such as sailors going ashore after a voyage. As a rule one bite is enough as it is pungent and disagreeable but even that sets up smarting salivation and soreness of the mouth if it is chewed before being ejected the buccal mucosa becomes swollen blistered and desquamates. In short on skin and mucosae the latex causes irritation and vesication and if swallowed salivation vomiting meteorism liquid stools with blood. The wood shows a handsome grain and polishes well but local carpenters will not often use it because the sawdust causes cough rhinitis laryngitis conjunctivitis and lachrymation Treatment is purely symptomatic.

The latex is sometimes used empirically as a liniment as a counter irritant and according to BODEAU as an anthelmintic [Though not included in the list of references there is a brief account of this together with a sketch of the leaves and fruit in BAX and ARCHBOLD'S *Practice of Medicine in the Tropics* Vol. 1 p 778.] H H S

VAN VEEN (A G) Kunnen peteh boonen djenkolvergiftigingen veroorzaken? [Peteh Beans and Djenkol Poisoning].—*Geneesk Tijdschr v Nederl Indië* 1938 Oct 18 Vol 78. No 42. pp 2619-2621 English summary

The djenkol bean *Pithecolobium lobatum* contains a poison djenkolic acid which causes symptoms of intense irritation of the urinary tract—renal pain dysuria perhaps anuria necrosis and fistula [see this *Bulletin* 1936 Vol 33 p 724] The notion that the peteh bean *Parkia speciosa* might also be a cause probably originated in the fact that it has a similar odour of volatile sulphuric compounds. Analysis of these beans revealed however no trace of djenkolic acid nor could any of it be found in the urine of those who had eaten them whereas it is readily found and in considerable amount after five young djenkol beans had been eaten. H H S

HAY (George Gray) Amaas.—*South African Med J* 1938 Sept. 10 Vol. 12 No 17 pp 639-642. [Summary appears also in *Bulletin of Hygiene*.]

The native settlers in the Zoutpansberg penetrated the country in two distinct groups. The northern group showed outbreaks of a disease resembling smallpox though the natives denied that it was so and called it amaas menzi Kimberley ziekte and other names, while the southern group showed cases of typical smallpox. In the author's experience amaas presents the following differences from and resemblances to classical smallpox.

1 Amaas is specially a disease of the winter months whereas smallpox occurs in hot as well as in cold climates

2. The chief characteristic of amaas is its very slight degree of infectivity

high altitude, there is no evidence of a geographical variation in erythrocyte counts if the population is carefully selected for a high health standard.

Haemoglobin determinations of 428 individuals of the same group gave a mean value of 16.73 gm. per 100 cc. blood. The Sahli acid haematm method was chosen, the instrument being calibrated by the van Slyke method. The results are compared with those of other workers and two possible explanations are suggested for the high mean obtained in Baghdad during summer: one is the very high health standard of the selected population and the other the relative anaemia due to the air density in July which is equivalent to the density in winter at 5 000-6 000 feet.

The author emphasizes the necessity for a proper appreciation of differences arising from technical or statistical sources in haematological determinations. The calibration of instruments is particularly important since as much as 20 per cent. difference may be found between instruments of the same type.

F. Murgatroyd

WAPTER (L. EVERARD) & MAJUMDAR (D. N.) *Haematological Studies in Indians. Part IX. The Analysis of the Haematological Findings in 57 Cases of Anaemia in Pregnant Tea-Garden Coolie Women with Special Reference to the Results of Treatment.*—*Indian J. Med Res.* 1938. Oct. Vol. 28. No. 2. pp. 541-595. With 37 graphs & 1 fig. [16 refs.]

The anaemias of pregnant tea-garden coolie women can be divided into two groups. One the iron deficiency group is slightly more common in primigravidae but may occur in any pregnancy or post partum. The typical blood picture is microcytic and hypochromic; the cells have a low haemoglobin concentration, anisocytosis is the rule; frequently there are normoblasts, the reticulocyte count is about 2 per cent. and there is usually a slight but distinct leucocytosis. The condition is not associated with low gastric acidity and the indirect van den Bergh reaction is usually negative. All patients had hookworm infection but there is little correlation between the degree of the infection and the anaemia, and there is no correlation between splenic enlargement and the anaemia. There is a good response to iron therapy in the early months of pregnancy and post partum, but in the latter months the response may be only slight until the uterus is empty when rapid improvement occurs. This anaemia seems to be an exaggeration of the anaemia of the normal population which, living at the lowest level of iron balance due to low intake and increased loss by hookworm disease, has on a whole a low level of haemoglobin associated with a small pale red cell. Although this is perhaps not the whole explanation the additional demand for iron during pregnancy or the extra loss of blood at parturition are determining factors in the development of the frank anaemia.

The second type, the Marmite-liver-deficiency group occurs in any but especially in the third and fourth pregnancies and becomes established at any month or post-partum but most frequently in the third trimester of pregnancy. The typical blood picture is hyper- or orthochromic and macro- or normocytic, there is some anisocytosis and polikocytosis; normoblasts and erythroblasts are seen in the peripheral blood but rarely megaloblasts, the reticulocyte count is

low and the leucocyte count is normal. There is no association with achlorhydria although there is an inconclusive association with a slightly lowered gastric acidity the van den Bergh reaction is usually positive and neurological symptoms are completely absent. There appears to be a definite correlation between the anaemia and splenic enlargement which with the positive van den Bergh reaction suggests chronic malaria as an important aetiological factor. There is a good response to Marmite by the mouth or to Campolon by intra-muscular injection but in the later stages of pregnancy the response may be counteracted or delayed particularly with Marmite until the uterus is empty.

A dietary survey of the population by Dr MITRA showed that although the total calories were not unduly low they were mainly derived from carbohydrates the total protein was low and the animal protein negligible while the total fat was also low and mostly of vegetable origin. The calcium intake was exceptionally low and the available iron was probably at the border line. The intake of vitamins A, B-complex and C were low although apparently A and B were not actually deficient as judged on most standards. Recent work suggests that calcium plays some part in the absorption and utilization of iron and the striking calcium deficiency together with the vitamin C deficiency may be of significance in the production of the hypochromic anaemias. The hyperchromic type may result from a dietary deficiency or possibly a minor toxæmia conditioned by the extra demands of a foetus in an individual on a border line diet and by chronic malaria.

F Murgatroyd

BEVERIDGE (A. J.) The Blood Picture in Singapore.—*Jl Roy Army Med Corps* 1939 Jan. Vol. 72. No 1 pp 1-11

Twelve healthy soldiers aged 20-30 years newly arrived at Singapore in October 1937 were examined under standardized conditions at monthly intervals until March 1938. The mean values for all the examinations were erythrocytes 5,512,000 per cmm, leucocytes 7,551 per cmm and haemoglobin 15.135 gm. per 100 cc. the differential white count gave polymorphonuclears 56.876 per cent, lymphocytes 37.676 per cent, eosinophils 1.963 per cent, basophils 0.339 per cent, and mononuclears 3.164 per cent. Total erythrocytes and leucocytes were much in keeping with the mean averages of a number of text books but the haemoglobin was 16 per cent. below the mean average the individual variations in haemoglobin were however considerable and there was no constant or progressive loss. Compared with text-book means the differential counts showed relatively low mean values for polymorphonuclears, eosinophils, basophils and mononuclears and a relatively high mean value for lymphocytes. It is not possible to draw any conclusion regarding these differences in view of the relatively small number of observations and the wide variations in counts obtained either in the same individual or in different individuals at the same time. The author notes that the leucocyte count of any individual may fluctuate during 24 hours by as much as 100 per cent., that under ideally standardized conditions it may vary by 30 per cent., and that the fortuitous error of counting a single sample may be 30 per cent. Those remarks demand the attention of all engaged in haematological work and indicate that considerable caution is needed in interpreting haematological data.

F Murgatroyd

McLEAM (John A.) Haematocrit Determinations in Normal and Abnormal Blood.—*Med Jt Australia*. 1938. Nov 5 25th Year Vol. 2. No. 19 pp 770-774 With 1 fig

Haematological determinations in a series of fifty-five normal persons were made in Melbourne Australia. Venous blood was used, 5 cc being collected in a small bottle containing 6 mgm. ammonium oxalate and 4 mgm potassium oxalate in order that changes in corpuscular volume might be minimal.

The mean values obtained are shown in the following table —

	Men	Women
Haemoglobin in gm. per 100 cc.	15.4	13.7
Erythrocytes in millions per cmm	5.1	4.7
Corpuscular volume in cc. per cent.	45.1	42.0
Corpuscular volume in cu	89	88
Corpuscular haemoglobin in $\gamma\gamma$ *	31	29
Corpuscular haemoglobin concentration as percentage	34	32

These values are compared with certain others obtained in the United States of America and in England, and the differences are seen to be relatively slight.

A number of cases of various blood diseases was then examined. Sixteen patients classified as suffering from hyperchromic macrocytic anaemia gave mean corpuscular volumes ranging from 114 cu to 170 cu, the average value being 138 cu mean corpuscular haemoglobin values ranging from 38 $\gamma\gamma$ to 58 $\gamma\gamma$ with an average value of 47 $\gamma\gamma$ and mean corpuscular haemoglobin concentrations from 29 per cent. to 45 per cent the average value being 35 per cent. Fifteen patients suffering from hypochromic anaemia gave mean corpuscular volumes ranging from 82 cu to 81 cu, the average being 73 cu mean corpuscular haemoglobin values from 13 $\gamma\gamma$ to 21 $\gamma\gamma$ with an average of 17 $\gamma\gamma$ and mean corpuscular haemoglobin concentrations varying from 17 per cent. to 27 per cent. with an average of 22 per cent. Values for a large group of secondary anaemias of various origins are given. In two cases of acholuric jaundice where the mean diameter of the red cells is less than normal, the mean corpuscular volume fell within normal limits and in a third but slightly below following the spherocytosis. The mean corpuscular volume in three cases of polycythaemia was within normal limits the mean corpuscular haemoglobin and mean corpuscular haemoglobin concentrations in two of the cases were slightly below normal.

F Margatroyd

GROSS (M) Un nouvel hémogramme. [A New Haemogram.]—*Schweiz Med Woch* 1938. Nov 19 Vol. 68. No. 47 pp 1272-1274

Nine vertical lines are used to represent respectively the total leucocytes per cmm. and the totals of the various subdivisions according to the classification of Schilling. Two parallel horizontal lines are then drawn to cut the vertical lines at points which are given values corresponding to the maximum and minimum numbers of the cells in normal blood, and the scales so determined are continued up the respective vertical lines. In any given count the values obtained are

$$1\gamma\gamma = 1 \text{ macromicrogramme} = 1 \times 10^{-12} \text{ gm}$$

joined by a curve which the author feels represents the leucocyte formula more clearly and more strikingly than mere figures. To plot this curve absolute values of the various cells are required and in order to obviate calculation of these figures from the percentage count the author has a simple nomogram. This consists of three vertical lines, scaled according to logarithmic series. The left line represents totals and the right percentages so that a straight line joining any two such values cuts the third vertical line at a point corresponding to the absolute count for such percentage and total. The author also gives a nomogram connecting total red cell count, haemoglobin value and colour index.

I Murgatroyd

PELLICCIOTTA (Raffaele) *Influenza del clima tropicale sulla formula leucocitaria e schema di Arneth nell'uomo sano. The Effect of Tropical Climate on the Differential Leucocyte and Arneth Counts* [*—Polichinco Sez. Prat. 1938 Oct 3 Vol 45 No 40 pp. 1805-1808 1811-1814*]

In continuation of his studies on the effect of the sudden change of climate from Italy to Abyssinia on Europeans in normal health [this *Bulletin* 1938 Vol 35 pp 839 and 845] the author now reports the results of the differential leucocyte and the Arneth counts carried out twice on 34 normal individuals. The examinations were made on blood taken first on board ship on entering the Red Sea and second about one month later in Direddau. Compared with the first examination the second showed that in the majority there was relative polymorphonuclear neutrophil leucopenia and relative lymphocytosis. The difference in these percentages is not great but appears to be statistically significant. There is a shift to the left in the Arneth index. These changes may persist for some months and although improvement later takes place the condition is not usually restored to the normal for temperate climates but corresponds with that found in the natives.

C H

MAEGRAITH (Brian) *The Polynuclear Count in the Australian Aborigine.—Australian Jl Experim Biol & Med Sci 1938 Sept. Vol 16 Pt 3 pp. 241-244 With 1 fig*

Arneth counts on blood films from forty-seven apparently healthy pure-blooded Australian aborigines of both sexes gave the following mean percentages: I 33.5 II 42.3 III 20.4 IV 3.5 and V 0.3 with a weighted mean of 1.95. This shows a marked shift to the left compared with the mean of whites living in England or Melbourne and is in keeping with the results of other polynuclear counts done on both natives and white people living in hot climates. [See also this *Bulletin* 1931 Vol 28 p 837]

F Murgatroyd

SAINT ETIENNE (J) *Sur un cas d'éosinophilie massive [A Case of "Massive Eosinophilia."]*—*Rev Méd Française d'Extrême-Orient* 1938 May Vol. 18, No 5 pp 532-538 [Summary appears also in *Bulletin of Hygiene*]

The author states that in the hospital of Lanessan, Tonking, he has been struck by the number of patients showing a high eosinophilia. The case here detailed is certainly peculiar and worth recording.

[May 1939]

A boy of 12 years who had been in good health until December 1936 when he sustained a fracture of the right tibia and luxation of the head of the left humerus with fracture of the surgical neck in a motor accident. The first fracture healed readily, the second necessitated resection of the head of the humerus. He was in hospital for five months with oscillations of temperature. Examinations of blood, urine of discharge from the wound and serological tests yielded nothing positive.

In January 1937 a differential leucocyte count gave 83 per cent. polymorphonuclears and 3 per cent. eosinophiles. In March he was noticed to be pale and for the preceding month had complained of being easily tired. The liver was enlarged and the spleen was palpable but there was no gland enlargement. On 14th March red cells numbered 4,340,000 and white 22,300 per cmm. 82 per cent. of the latter being eosinophiles. This being unexpected the count was repeated a next two months the red ranged up to 5,280,000 and the white between 52,000 and 14,600 (the last in May) and eosinophiles between 83 and 55 per cent. (the lowest also in May when the general condition had improved).

Repeated examinations failed to reveal any definite cause for this remarkable eosinophilia, except for a few *Trichuris ova*, there were no signs of helminthic infestation. The Casoni test for hydatid was negative. There was no skin disease no allergic condition (asthma etc.) no myeloid leukaemia. By examination there remained two hypotheses: an eosinophilic leukaemia, a name proposed by AUBERTIN and GIRON in 1921 or some autonomous affection of some blood-forming organ or tissue a primary disease of the spleen (noted by CHALLIER and LEVRAT). There was a little splenic enlargement in this patient and some marrow disturbance resulting from the fracture of the neck of the humerus, but this seemed inadequate to account for the blood changes. The author consequently designates it as essential massive eosinophilia until something more positive is discovered regarding its aetiology. (See also PIRERA, *Bull. of Hyg.* 1939 Vol 14 p 224.)

H H S

FAIRLEY (N. Hamilton) BROMFIELD (R. J.) FOY (Henry) & KOWDI (Athena). Nutritional Macrocytic Anaemia in Macedonia. A Preliminary Report.—*Trans. Roy Soc Trop Med & Hyg.* 1938. Aug 25 Vol 32 No 2 pp 133-173. [25 refs.] Discussion pp 173-182. [WILLS (Lucy) VAUGHAN (Janet) NAPIER (L. E.) McROBERT (G. R.) FRASER (G.) FAIRLEY (N. Hamilton)]

During a previous study of blackwater fever the authors were impressed by the frequency and severity of the anaemia encountered in Macedonia. The anaemia which persisted despite antimalarial treatment and iron medication was in a number of cases megalocytic and was regarded as falling into the category of tropical macrocytic anaemia. This year the authors studied the situation in more detail and the present paper records a wealth of haematological observations which they summarize as follows —

1. It is suggested that the title tropical macrocytic anaemia be changed to nutritional macrocytic anaemia, and that two sub-groups be recognized (1) non-haemolytic, (2) haemolytic.

2. In Macedonia nutritional macrocytic anaemia is predominantly of haemolytic type. It is prevalent amongst the refugee peasants occurring especially during pregnancy and is found in patients coming into hospital for malaria and blackwater fever.

3. Males as well as females are affected. It is most common in females during the child bearing period owing to the added nutritional demands of pregnancy and lactation.

4. The haematological and biochemical data and the clinical findings in a group of thirty seven cases of nutritional macrocytic anaemia associated with pregnancy are analysed and discussed.

5. The red cell counts of three infants born of severely anaemic mothers suffering from this disease showed little if any deviation from the normal being 5 600 000, 6 730 000 and 6 980 000 erythrocytes per cmm. The mothers' counts were 1 293 000, 1 145 000 and 1 425 000 erythrocytes per cmm. respectively.

6. A study of sternal marrow smears indicates that there is a panmyelopathy characterized by erythropoiesis with megaloblastic degeneration, the production of pathological precursors of the white cell series, and an abnormal condition of the megakaryocytes.

7. This state of affairs is reflected in the peripheral blood by a megalocytic anaemia, a tendency to leucopaenia with a shift to the left and a decrease in the platelet counts.

8. Purpuric manifestations are seen in approximately 25 per cent. of cases and are associated with thrombocytopenia. The count in five purpuric cases averaged 29 270 platelets per cmm.

9. There is no evidence of vitamin C deficiency in the diets of these patients and the thrombocytopenic purpura is regarded as originating in a pathological condition of the marrow.

10. In a number of cases of tropical macrocytic anaemia of haemolytic type an increased mean corpuscular volume was found to be associated with a normal mean corpuscular diameter and an increased mean corpuscular thickness.

11. These data indicate that a condition of megakospherocytosis exists but before this can be accepted as correct further observations are necessary to eliminate the possibility of undue corpuscular shrinkage with Jenner staining.

12. The pathology of two cases is described in detail and evidence is presented that the splenomegaly resulted from chronic malaria, and the enlarged nutmeg liver from chronic venous congestion due to heart failure secondary to anaemia.

13. Microscopic sections showed a very marked decrease in the Malpighian corpuscles and lymphoid tissue in the spleen and considerable activity and hypertrophy of the R.E. cells in both spleen and liver.

14. Malarial pigment was demonstrated in the Kupffer cells of the liver and the endothelial cells of the spleen. haemosiderin which was present in considerable quantity in the liver and distributed mainly in the outer zone of the lobules adjacent to the portal canals, was less evident in the spleen.

15. The diets of the refugee population in general and of our patients in particular were deficient in sources of animal protein and fat such as meat, chicken, milk and butter and were similar in many respects to the diets of people in the tropics who develop tropical macrocytic anaemia.

16. The non-haemolytic type of nutritional macrocytic anaemia is rare in Macedonia, but when it occurs uncomplicated dietary deficiency appears to be the basis of the condition.

17. In the common haemolytic type some additional haemolytic factor is implicated. It is suggested that this is not a direct parasitic effect on the red cell, but is due to the phagocytosis of abnormal red cells derived from a pathological marrow by the R.E. system which becomes activated and hypertrophied as a result of chronic malaria infection.

[May 1939]

In the subsequent discussion Dr Lucy WILLS suggested that the nutritional deficiency was some factor distinct from the liver principle and that it would be a mistake to fix attention too closely on sources of liver principle itself or of Castle's extrinsic factor. Although agreeing with the theory of a nutritional deficiency she pointed out that experimentally macrocytic anaemia with megaloblastic marrow can result from haemolysis. Discrepancy between Price Jones curves and mean corpuscular volume was probably a matter of staining but the effect of increased bilirubinaemia was due to technique. Dr Janet VAUGHAN did not think the discrepancy was due to technique and found it associated with increased fragility in certain anaemias of pregnancy as in acholuric jaundice. Dr L. E. NAPIER remarked that in India microcytosis, possibly due to diet or worms, was common and that anaemias which might elsewhere be termed normocytic represented there macrocytic anaemias. He had also concluded that macrocytic anaemia was due to diet and malaria. Lt.-Col. G. R. McROBERT pointed out that histamine-resistant achylia associated with macrocytic anaemia may become normal after treatment and stressed the importance of differentiating such cases from true pernicious anaemia. Dr WILLS added that histamine-resistant achlorhydria may be associated with deficiency of vitamin B₁₂, which may be corrected by administration of marmite or liver. Dr G. FRASER emphasized the gravity of nutritional anaemia complicated by malaria in Assam, its resistance to treatment and its grave prognosis.

F. Mergalroyd

CHAUDHURI (Sujata) & MANGALIK (Vannali) Idiopathic Hypochromic Anaemia. Its Aetiology, Diagnosis, Treatment and Report of Four Such Cases.—*J. Indian Med Assoc.* 1939 Nov Vol 8 No 2 pp 78-85 [27 refs]

This paper gives a summary of iron deficiency anaemia and describes in detail four cases. The authors point out that chronic iron deficiency especially in the face of increased demands for iron as happens particularly in women is responsible for a good deal of chronic ill-health, and that this type of anaemia is far more common in India than is generally believed. They deprecate uncritical and wasteful treatment with liver preparations in anaemias which can be cured comparatively cheaply by iron.

F. Mergalroyd

SCHREITENMAYER (A) & LANCASTER (R. L.) Sternal Pancreas, with Special Reference to its Application in Tropical Diseases in South China.—*J. Trop Med & Hyg.* 1939 Nov 1 Vol 41 No. 21 pp 341-345

Most of the material of this paper has been previously published elsewhere and has been reviewed in this Bulletin [1939 Vol 35 p 849]. The present paper adds that in smallpox the typical changes in the bone marrow consist of a myelotic reaction combined with an increase of the reticulum and plasma cells.

F. Mergalroyd

SHUKERS (Carroll F) LANGSTON (William C) & DAY (Paul L.) The Normal Blood Picture of the Young Rhesus Monkey.—*Folia Haematologica* 1938. Vol 60 No 4 pp 418-424 [23 refs]

The paper describes the technique employed and the results obtained in studying the blood pictures of nineteen young healthy rhesus

monkeys (*Macaca mulatta*) maintained for relatively long periods under standardized laboratory conditions. For each blood constituent approximately one hundred and fifty determinations were made. The maximum and minimum values obtained give a false idea of the dispersion of the data for healthy animals as few determinations fell near the extremes and most of the results were grouped closely around the mean. The middle 68 per cent of the data fell within the following ranges, which are tentatively suggested as normal for immature animals of this species: volume of packed cells 36-44 per cent, haemoglobin 10.9-13.5 grams per 100 cc, erythrocytes 4 600 000-5 800 000 per cmm, reticulocytes 0.5-0.7 per cent, leucocytes 9 700-20 500 per cmm, neutrophils 20-52 per cent, lymphocytes 44-74 per cent, platelets 318 000-623 000 per cmm, and clotting time 32-124 seconds.

A table which summarizes the results obtained by previous workers is given, and the paper is of value in view of the use that is now being made of the rhesus monkey for experimental purposes and particularly for haematological studies, since the haematopoietic system of these animals behaves in a manner remarkably similar to that of man.

F. Murgatroyd

RIVOALEN (A.) Le rôle du système réticulo-endothélial dans les maladies coloniales, infectieuses et parasitaires. [The Reticulo-endothelial System in Infectious and Parasitic Diseases].—*Les Grandes Endémies Tropicales* 1938. Vol. 10. pp. 76-97.

SIMMONS (James Stevens) The United States Army's War in the Air against the Mosquito-borne Diseases.—*Amer. J. Med. Sci.* 1938. Aug. Vol. 196. No. 2. pp. 153-167. With 3 figs. (1 map) [47 refs.]

This is a review of mosquito-borne diseases so far as they occur in the regions in which the United States Army normally operates. The control of these diseases (yellow fever, dengue, malaria and equine encephalomyelitis) is viewed particularly from the standpoint of the military authorities. Troops may be called upon to operate in regions where jungle yellow fever is prevalent and therefore obtain no protection from the usual methods of control of *Aedes aegypti*. The cost of controlling *Aedes* is such that it is not practised in regions where yellow fever is absent, such as the Philippines; yet an outbreak of dengue might jeopardize the success of a campaign. In the Panama Canal zone, although the incidence of malaria among the coloured employees has remained at about 16 per thousand for the last 20 years, the incidence among the troops in that zone is twice or three times as great. This is attributed to lack of resistance and to the army posts being located nearer to the unsanitized jungles. The conclusion is reached that specific prophylactic agents, either drugs or vaccines, are more suited for military purposes than the elimination of the insect vectors.

V. B. Wigglesworth

HALL (Maurice C.) The Bedbug, Its Relation to Public Health, Its Habits and Life History, and Methods of Control.—*Public Health Rep.* 1937. Supp. No. 129. 7 pp.

This is a short account of the biology, habits and control of the bed bug *Cimex lectularius* L. There is little to indicate that the

author has studied the more recent literature on the insect and the report is to say the least naive. The importance which is apparently attached to the rôle of *C. lectularius* in disease transmission is scarcely warranted by the present uncertain knowledge of the status of this insect as a natural vector.

Some errors in the report occur in the following statements —

Cimex hemipterus normally a parasite of birds and bats in the Old World sometimes becomes a parasite of man. *C. lectularius* (*holandicus*) is, of course as great a pest of man as *C. lectularius*. Checking development by starvation may result in additional moulting periods. Feeding and developing practically cease at 50°F. Hatching and moulting cease at 56°-57°F (13-5°C). The temperatures which are most favourable lie between 64 and 82°F and the author himself states 8 lines above that large numbers of the bugs are "killed by temperatures of 96° to 100°F or more when accompanied by fairly high degrees of humidity. Nothing is known about the effect of humidity over this temperature range however although MILLARBY (1935) has shown that at 104°F (40°C) and 111.3°F (44°C) with exposures of 24 and 1 hour respectively humidity had no effect. Fumigation by means of burning sulphur is also very effective. Sulphur fumigation although widely used is not very reliable, and has as many critics as advocates.

Ho (Ch 1) The Significance of the Female Terminalia of House-Flies as a Grouping Character.—*Ann Trop Med & Parasit* 1938, Oct 12 Vol 32, No 3, pp 257-312. With 13 figs.

The precise identification of "house-flies" is *Musca domestica* and its close relatives is exceedingly difficult. It is also important because different members of this group breed in different ways and are not equally important in hygiene. The inherent difficulties of identifying these insects have been by no means diminished by some of the papers written on the subject.

The author of the present paper takes the view that the most fundamental differences in the genus *Musca* relate to reproduction. He calls attention to the three types already familiar in one the female lays batches of rather small eggs in the second she lays larger eggs with pedicels a small number at a time in the third she deposits single larvae which have already reached the second or even third stage. The author finds corresponding differences in structure in the terminal segments of the female and bases his classification of the species on these characters. Whether the classification and points of difference will "work" time alone can show but it appears that the system is reasonable and the present paper sound.

P. A. Buxton

TAYLOR (Frank H) Intermediary Arthropod Hosts and Mechanical Carriers of Rums Diseases in the Australian Region.—*Health* Canberra 1938 Aug Vol 8 No 2 82. With 1 map.

MORIOKA (Koichi) Experimental Studies on the Biological Behaviours of *Trichomonas hominis* Part III. The Influence of Temperature, Oxygen and Various Additional Substances on the Rate of Growth and Vitality of *Trichomonas hominis* in Tanabe's Medium. Part IV. The Phenomena of Increasing and Diminishing Phases of Multiplication of *Trichomonas hominis* of Stimulated Nutrition, and the Changes in Viscosity of the Culture Medium. Part V. Effects of Various Osmotic Pressures on Food Ingestion by *T. hominis*. Part VI. On the Vital Staining of *Trichomonas hominis*. Part VII. The *Trichomonas hominis* and its Relation to the Intestinal Bacteria, with Reference to the Influence of Trypanotoxin and Bacteriophage on the Parasite. Part VIII. The Fermentation of Carbohydrates. Part IX. The Production of Hydrogen Sulphide by *T. hominis*. Part X. The Ability of *Trichomonas hominis* to produce Indole.—*Taiwan Igakkaï Zasshi* (*Jl Med Assoc Formosa*) 1938. Apr. Vol. 37 No 4 (397) [In Japanese pp 635-647 649-656 658-668. With 8 charts 671-677 English summaries pp 648 657 669-670 677] and May, No 5 (398) [In Japanese pp 838-849 [15 refs.] 851-860 With 4 charts. [14 refs.] 862-865 [13 refs.] 866-868 English summaries pp 850 861 865 869]

In these investigations the author studies the growth and vitality of *Trichomonas hominis* in Tanabe's medium under varying conditions. It was found that the addition of haemoglobin mucin and starch stimulated the growth. It was also noted that during the course of subculture every two days there were periods of active growth fluorescent period, followed after an interval of 14 to 16 days by a period of poor growth decadent period. These periods occupied 4 to 6 days.

During the active growth period the culture medium became viscous as a result, presumably, of a mucin-like substance secreted by the flagellates. The effects of variations in concentrations of salts (sodium chloride potassium chloride calcium chloride and sodium citrate) were also studied. It was found that the activity as judged by the number of starch grains ingested was greatest when the salt concentration was a little below that of tissue fluids. At other concentrations the vitality of the flagellates was lowered.

In their reaction to vital strains of which 35 were tested on the flagellates it was found that the basic dyes were those which gave a positive result. The granules taking up the stain were mostly those in the anterior part of the organisms. The various bacteria associated with the flagellate were investigated as regards any influence they might have on the cultures. *Bact. faecalis alkaligenes* exerted a stimulating influence on the cultures as also did a number of bacteriophages including those of *Bact. coli commune* *Bact. typhosum* and certain dysentery bacilli.

By comparing the changes which take place in certain media in which bacteria are growing with those which occur in exactly similar media when the bacteria are accompanied by trichomonas it was determined that the flagellates stimulate the decomposition of various sugars added to the medium and in other media give rise to sulphuretted hydrogen and indol.

[May 1938]

Escomet (Edmundo) La tricomonomas vaginal, vesical, intestinal y gingival. Su terapéutica específica. [Specific Treatment of Vaginal, Vesical Intestinal and Gingival Trichomonas Infections.]—*Ger Med de Caracas* 1938 Mar 3] Vol. 45 No. 6, pp 86-93

This is a general article on the various trichomonas infections of man and the methods of treatment which have given successful results in the author's experience.

HORN (Arthur E.) Notes on Public and Private Health Control in Tropical Africa.—VIII Convegno Volte Roma 4-17 ottobre 1938 10 pp

It is not yet possible to tell whether races indigenous to temperate zones can successfully and with unimpaired vigour inhabit the tropics for generation after generation though evidence from Central America and Northern Australia indicates that it may be possible. Climate is a factor beyond the power of man to change in the present state of knowledge but in Tropical Africa the control of the associated endemic and epidemic diseases is essential to successful colonization.

A brief description of the general medical organization adopted in the British Dependencies in Africa is given, and mention is made of the medical education of natives and of the Health branch with its subdivisions designed to concentrate on diseases of special importance. The efforts of the Medical Departments must be seconded by other resident Europeans and for this reason officials recruited by other means must not only be physically fit, but also, as part of their preliminary training, must be made familiar with the nature of the diseases and insanitary conditions they may meet. The advantages of local and home leave and of sufficient exercise and recreation are emphasized. European women, whether employed as nurses, teachers etc. or carrying out their domestic duties as wives of residents can maintain as good health as men, but in only a few parts of Tropical Africa do children remain beyond the age of 10 or 12. Pregnancy is more trying than in temperate climates.

Neurasthenia is not uncommon and may result from overwork and ill-balanced conditions. Modern facilities however of travel, communication and contact through broadcasting are improving the lot of colonial officers and though the problem of permanent settlement is not yet solved, the present results justify confidence in the future.

C II

WALSH (Groesbeck) & POOL (Robert M.) Disease and the Negro.—*Amer J Med Sci* 1938 Aug Vol. 193 No 2, pp 252-291

A footnote to this paper notes "This contribution is the foreword of a book of the same title upon which the authors are at present engaged. Attention is called to the observed variations in form, movement and structural differences etc. between the negro and the white man. The diseases of the two races are said not to differ in any essential detail and it is added that during 18 years of diagnostic research the normal findings were for all practical purposes identical and provided no evidence of true racial differences. Yet trained observers have noted that disease patterns of the two races do appear to differ in main respects and in an attempt to discover whether any common

cause could be held responsible for the increased frequency of some diseases and the diminished frequency of others among coloured patients a special investigation was undertaken. In view of the fact that clinical and laboratory records failed to produce evidence of true racial differences in regard to disease it was believed that former investigations were founded on too narrow a base since the mental aspect of the problem had not received the attention its importance deserved. White people are said to reflect an attitude conditioned by a greater knowledge of the subject of human sickness—though the educational campaign by which the laity have become acquainted with the ills of the flesh has by no means proved an unmixed blessing—they appear in consequence to have developed an alertness in regard to the state of their health and are inclined to magnify the physical and physiological changes which characterize the life processes of the human organism. The negro on the other hand appears to live at peace with the various organs of his body and his attitude towards all forms of sickness seems to be one of disregard and of the belief that in the end such troubles will tend to right themselves.

In these circumstances it is stated that the great mass of symptoms without any underlying discoverable lesions which bring thousands of patients to the physician suffering from what are termed functional disorders serve no such end in the case of the negro who is thus spared the fear of many diseases because they have never taken definition in his mind. On the other hand the occurrence of what is defined as organic disease is higher in the negro than in the white such misfortunes are also met with in more advanced stages for as a rule they are only disclosed after long periods of progress. Here the negro's disregard of all forms of disease acts to his detriment. It is claimed that if the white man employed the same emotional defences his history of disease would parallel that of the negro that up to the present no psychogenic origin of the noted differences in disease patterns has been suggested that despite present difficulties these theories may yet be fully proved and that the study of disease in the negro will advance rapidly all knowledge of the psychogenic factors of disease as it occurs in the two races.

Attention is called to the fact that the two cultural levels are so entirely different that two taking-off places are provided for the comparative study of the problem though in course of time this opportunity will be lost since already in certain communities where the two races are inclined to mingle more freely the attitude of the negro towards disease is gradually becoming to resemble that of the white. In the search for a genotypic form of disease in the negro the sum total of his personality must be taken and not merely the physical workings as they are shown in his body for whatever has been an element of strength in his workaday life remains with him when he takes to his bed through sickness since sickness is not a separate life into which he enters shutting all doors of his past life behind him.

P Granville Edge

DE BOER (H S) Health Propaganda amongst Indigenous Races in the Tropics.—*Jl Roy San Inst* 1938 Oct Vol 59 No 4 pp 286-296

The author emphasizes that the complex mixture of races languages and customs which is the rule in tropical countries, adds enormously

to the difficulty of education. An encouraging fact, however is that the number of educated Natives is constantly increasing, and that, especially in Africa literature in the Native dialects is avidly sought. He considers that preventive and curative medicine should go hand in hand. The value of the spoken word in health education is greatest when it is used in the form of quiet informal discussion with elders and chiefs who, as a rule take their responsibilities seriously. Posters the cinema and magic lantern broadcasting, models and health shows are discussed and the excellent plan by which, in Uganda, model houses are built and occupied by picked Natives on condition that the occupants take every opportunity to show their friends and acquaintances around is mentioned. Attention should be paid especially to the education of the young, and in this work the co-operation of Missionaries and members of the Education and Administration Departments is of the greatest value. The work is difficult and often disappointing and requires tireless attention to follow-up and maintenance but it is necessary that it should be undertaken.

It is heartening to know that a worker of long experience in Africa pays to the Natives the deserved tribute of intelligence and responsibility.]

C II

REVIEWS AND NOTICES

ROME. *COMITATO ROMANO PER L'ASSISTENZA ANTIMALARICA. L'Opera del Comitato Romano per l'Assistenza Antimalarica dal 1921 al 1935* [The Achievements of the Roman Committee for Anti Malaria Assistance from 1921 to 1935]—98 pp With 47 figs. on 32 plates & 2 folding maps 1938 Rome Luigi Proja Via Emilio Faà di Bruno 7

Much has been written in recent years about Italy's outstanding achievement in converting malaria-stricken uncultivated wasteland in the neighbourhood of Rome into productive agricultural areas with flourishing townships and villages inhabited by prosperous and healthy people. That transformation has now been completed and the present report gives a detailed and interesting description of persistent effort crowned with success.

The *Comitato Romano per l'Assistenza Antimalarica* was founded in 1921. Its object was to promote and intensify the prevention and treatment of malaria in the Province of Rome. The return of soldiers after the war with fresh strains of plasmodia had increased the incidence of the disease. In the early years chief attention was given to the distribution of quinine. Subsequently the construction of canals, training of water courses, land reclamation, controlled agriculture, road construction and the building of hygienic dwellings were accompanied by the creation of health and social services and the provision of adequate medical care for the population. Two large scale maps and 47 excellent photographs assist the reader to obtain an idea of the transformation that has been effected in so short a time and the magnitude of this excellent example of *bonifica integrale*.

Norman White

BOTREAU ROUSSEL [Médecin-Général, Directeur de l'Ecole d'Application du Service de Santé des Troupes Coloniales (Pharo)] with the collaboration of M^l ASSALI DEJOU HUARD MONTAGNÉ PALES & ROQUES [Chirurgiens des Hôpitaux Coloniaux, Professeurs agrégés du Pharo] *Clinique chirurgicale des pays chauds*. [Clinical Surgery in Hot Climates] Préface du Pr Ch LENORMANT—pp vi+335 With numerous illustrations. 1938 Paris Masson et Cie 120 Boulevard Saint-Germain [80 fr.]

It is refreshing if a little chastening to read the views of experienced clinicians from a different school.

Such is the position of an English reader of this excellent and practical book. For example emetine was apparently used by Magendie but fell into disuse to be rediscovered only by Sir Leonard ROGERS in 1912. Again the ravages of the amoeba are widespread even to urinary amoebiasis while it is stoutly denied that the *F. bancrofti* plays the rôle of causal agent in elephantiasis attributed to it by Manson and his followers. Any connexion between the two, if not imaginary must be coincidental! Open operation is preferred for liver abscess to aspiration which is dismissed with scant notice.

Such matter however will be considered by readers in the light of personal experience and does not detract from the value of the book for those practising abroad. Excellent is the care with which common

Other sections on tests and microscopic methods, on dietetics and foods on sterilization, disinfection and chemotherapy X rays, radium and electrotherapy give much varied and useful information. It is not possible to indicate here all the ground covered, though it may be truly said that the reputation of the "Extra Pharmacopoeia" as an almost indispensable source of quick and accurate information is fully maintained by this volume.

R. L. S

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN.

Vol. 36]

1939

[No 6

SUMMARY OF RECENT ABSTRACTS

V LEISHMANIASIS*

A VISCERAL LEISHMANIASIS

Epidemiology

Cases of kala azar are described by various authors in France Italy and China (p 177) PÉNU and BLATON (p 809) mention three children from the Vosges the Ardèche region and from the Grenoble area suffering from kala azar. None of them had ever been to the endemic region in the south of France.

In the Naples area LAURINSICH (p 858) found that infantile kala azar occurs endemically and may be limited to one or two streets in a village. It commences most commonly in infants of 12 to 18 months and the first symptoms are most frequently seen from June to September especially in the latter month. From 1916 to 1926 the numbers seen increased as treatment became popular but since then have declined probably owing to the influence of treatment.

Kala azar is widespread in the eastern half of the Province of Argolis Greece and KIRIMILIDIS (p 859) shows that it resembles the disease found in other endemic areas. In one group of villages it assumed epidemic form. MOLLOW (p 866) records the definite diagnosis by liver and bone marrow puncture of the first autochthonous case of kala azar in southern Bulgaria and thinks that the disease exists on the Black Sea coast.

ANDERSON (p 858) shows that the number of cases reported from Tunisia has now reached 131 and discusses the epidemiology of the disease (in the original paper). In the Fung province of the Sudan HENDERSON (p 178) reports that the majority of cases of kala azar show their first symptoms between August and February. The disease attacks mainly children and young adults and is most liable to occur among those in a state of malnutrition though cases occurred in the well fed police. A history of familial infection was not uncommon.

TARTAGLIA (p 182) reports that 7-8 per cent of dogs in Split were found to be suffering from kala azar. Human cases were commoner

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1938 Vol. 35. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

in villages than towns and *P. major* has been demonstrated wherever the cases occur. DOXATHEX and LESTOQUARD (p. 872) studied the course of canine kala azar in Algiers. No symptoms may be shown for weeks or months, even in heavily infected animals. Relapse of symptoms may occur. Exposure to reinfection is constant and is sometimes followed by exacerbation of symptoms. Canine kala azar was found in 5 of 83 dogs examined in Dakar by CURASSON *et al.* (p. 871). One was in good health. LEZ (p. 182) found kala azar in one stray dog of 90 examined in Peiping, and in a house dog associated with a child suffering from the disease.

Actiology

SANGIORGI (p. 177) reports the finding of two distinct types of parasite in a spleen smear from an adult patient with kala azar in Italy. The distinction between them was not that between *L. donovani* and *L. infantum*.

LAURENSICH (p. 177) adds goat's milk after separation of fat, to the liquid of condensation of \ N \ medium for the culture of leishmania. PAONI (p. 878) also uses goat's or cow's milk in place of blood, with \ N \ medium, for the cultivation of leishmania from kala azar and oriental sore.

KHAW (p. 873) succeeded in infecting the mole rat (*Mosopalex fontanieri*) and the ground squirrel (*Citellus danielsoni mongolicus*) with *L. donovani* in China. NA CURRA (p. 875) successfully infected the hamster, rhesus monkey and dog with the leishmania of S. American kala azar and produced cutaneous lesions in the two latter animals by injecting cultures of the parasite of S. American cutaneous leishmaniasis. ADLER (p. 873) infected the Syrian hamster with cultures of S. American visceral leishmania. The old view that the leishmania could not infect laboratory animals (which was regarded as a differentiation from *L. donovani*) cannot therefore be maintained.

CHAGAS *et al.* (p. 873) review present knowledge of kala azar in South America. Leishmania were found in 41 of 47,000 specimens of liver examined by the viscerotomy service for yellow fever. The disease and the organism differ very little, if at all, from kala azar and *L. donovani* of the Old World, but the differences between the mucocutaneous leishmaniasis of S. America and oriental sore are more pronounced. There is therefore more justification in differentiating *L. braziliensis* from *L. tropica* than *L. chagasi* from *L. donovani*. The distribution is fairly general in N.E. Brazil and the Chaco district of the Argentine. DEANE (p. 875) also notes the similarity of the kala azar of Brazil to that of the Old World.

Transmission.

SOUTHWELL and KIRSHNER (p. 860) maintain that proof of the infectivity of flagellate forms of *L. donovani* has not yet been obtained and therefore that the transmission of kala azar is the result of the deposition on the skin of leishmania forms when an infected insect is crushed. WENYON, however, comments that successful infection has been produced by the bite of sandflies in India, and that fluid on which infected sandflies have fed, and which contains flagellate but not leishmania forms, is infective.

MALAMOS (p. 863) failed to transmit kala azar from hamster to hamster by the bite of the dog tick *Rhipicephalus sanguineus*. Successful infection by the injection of crushed ticks, therefore

probably only indicates the capacity of leishmania to survive for varying periods in the gut of certain blood-sucking arthropods.

THEODOR (p 862) records that one specimen of *P. langeroni* was found in a kala azar area of the Sudan. This is the first record of one of the major group from that area. SUN and WU (p 861) found that 11 out of 537 *P. chinensis* examined in North China were naturally infected with *L. donovani*. Flagellates were found in the mid-gut hind-gut and proventriculus. *P. chinensis* is the chief if not the only vector in that region. These authors also (p 862) succeeded in infecting *P. chinensis* and *P. sergenti* var *mongolensis* from man and hamsters but the infection in the latter tended to die out when the blood was digested. RAYNAL (p 862) also shows that *P. chinensis* is the most widespread species in North China. It is most abundant in June and hibernates as a larva. It has been found infected in nature is readily infected from man and hamsters and although transmission by bite has not been achieved, the intraperitoneal injection of crushed infected insects into hamsters easily produces infection.

Pathology

PAI and HU (p 867) have not found any evidence of leucolysin in kala azar to account for the reduction of leucocytes. They point out that a fallacy in counting leucocytes may arise from the tendency of these cells to adhere to glassware and this accounts for most of the apparent reduction in numbers. These authors (p 868) show that in infected hamsters there is anaemia and leucopenia reduction in small lymphoid cells increase in large lymphoid cells and also in polymorphonuclear neutrophils due to extramedullary proliferation in the spleen and elsewhere. This does not occur in man.

As a result of agglutination tests, DA CUNHA (p 866) concludes that leishmania possess thermostable flagellar antigens and thermolabile somatic antigens.

MALAXOS (p 179) failed to immunize hamsters against *L. donovani* or to cure infection by giving immune serum prepared in rabbits but the latter procedure tended to prolong the disease. The addition of immune serum to cultures tended to retard growth but there was no specific action. The same author (p 180) reports an unusual course of *L. infantum* in producing infection in the pancreas of a white mouse.

Clinical

By the use of Shortt's technique of producing straight-ended blood films in which numbers of leucocytes are gathered WANG (p 178) found leishmania in 39.1 per cent of 23 proved cases of kala azar.

D OELSCHITZ (p 869) in France places most reliance on sternal puncture and on the increased density of the serum under the influence of organic antimony compounds as judged by photometric methods in the diagnosis of early kala azar. Bone marrow examination was successful in providing a diagnosis in a patient reported as having contracted kala azar in Valencia by LEMIERRE *et al* (p 865). The various serum abnormalities gradually disappeared under treatment.

Puncture of lymphatic glands has been a successful diagnostic procedure in four cases of childhood kala azar in the hands of GIRAUD *et al* (p 868).

GIRAUD and GAUBERT (p 868) point out the dangers of spleen puncture and record three deaths. All other methods of diagnosis should first be attempted but the risk of spleen puncture is less than

that of prolonged antimony treatment carried out on presumptive diagnosis alone. HENDERSON (p. 178) in 300 patients in the Sudan found leishmania always in the spleen in 1 per cent. in the blood and in 7.5 per cent. in the nasal mucus.

SHORTT and SWAMINATH (p. 890) have found *L. donovani* in the nasal mucus of 6 of 15 further patients with Indian kala azar and infected a hamster with one specimen. This patient came to Coimbatore from Malabar in neither of which districts has kala azar previously been reported [See also this *Bulletin* 1938 Vol. 33 p. 18.]

ANDERSON and DISDIER (p. 869) found that the complement fixation test of Nattan-Larrier and Grunard-Richard was not sufficiently specific to be of value in the diagnosis of kala azar. NICAUD *et al.* (p. 864) describe a patient with kala azar contracted in the south of France. The formal-gel test was intensely positive within a few seconds and the globulin and euglobulin level was markedly increased. Diagnosis was not made until over a year after the onset and the infection was heavy. DEANE and DEANE (p. 184) found that the formal-gel test was positive within 4½ minutes in each of four patients with South American kala azar. In other diseases and in normal persons the shortest time was 11 minutes and in the majority it was an hour or more. GASPERINI (p. 837) shows that like the formal-gel reaction, the reaction of Camptopetros is modified if the serum is subjected to ultrafiltration before use. It would appear that the molecules of proteid responsible for these reactions are not all of the same size. The details of the test are given in the original abstract. Henry's reaction similarly does not occur with such serum.

RUPNEV (p. 859) diagnosed the first case of visceral leishmaniasis in Daghestan by Ray's reaction, Frey's adrenalin test and by finding leishmania in the monocytes of blood films. None was seen in spleen smears.

HERK (p. 866) records simultaneous cutaneous and visceral leishmaniasis in a native of the Sudan. PANJA (p. 878) describes nodular lesions of the tongue in which leishmania were found. This appears to be the first time that tongue lesions have been described in dermal leishmaniasis following kala azar. WRIGHT (p. 178) shows that retinal haemorrhages into the posterior segment of the eye appear to be the only conditions having relation to kala azar and malaria. They probably depend on the severity of the anaemia rather than on the toxæmia.

PICCINELLI (p. 866) suggests that the rapid response to treatment of a case of typhoid fever with kala azar may have been due to some kind of antagonism between the two diseases. NAPIER (p. 178) considers that if kala azar is accompanied by some other disease the kala azar should be treated first but it is important to know that antimony treatment appears to aggravate pulmonary tuberculosis.

CHAGAS and ROMANA (p. 179) describe two cases of a disease resembling kala azar with leishmania in the endothelial cells of liver and spleen puncture material, in the Argentine.

DE OLIVEIRA (p. 874) describes typical kala azar in a boy in Brazil, cured by iofradin and neostibosan and CHAGAS and CHAGAS (p. 875) discuss the epidemiological features of this case.

Treatment

ERVEN (p. 870) showed that the activity of the pentavalent compounds is associated with a histocyte response in the blood, and

the beneficial action in kala azar is probably due to a double action one on the parasites and one on the tissues. Trivalent compounds like souadin are inactive.

HIKUTH and SCHMIDT (pp 182-870) used the European hamster for testing drugs controlling infection by liver puncture and serological tests. By giving solustibosan the toxicity of which is low larger amounts of antimony can be administered than in the case of other pentavalent organic compounds. One cc contains 20 mgm. antimony and 6 cc. corresponds to 0.39 gm. neostibosan. WANG and LEE (p 871) found that it is possible to give to Chinese hamsters much larger doses of antimony than were used by certain earlier workers. Thus 0.4 gm. neostibosan per kilo body weight subcutaneously or intramuscularly twice weekly to a total of 7 gm. per kilo cured 50 per cent. of the infected animals.

WEESE (p 180) found that solustibosan in reasonable doses does not produce local irritation on injection. The dog excretes 80 per cent. of the antimony in 24 hours as against 50 per cent. when neostibosan is used. STRUTHERS (p 180) agrees with WEESE that the mouse will tolerate more antimony in the form of solustibosan than in that of neostibosan. He gives in man intravenous injections of 2 cc. (42 mgm. antimony) followed by 6 cc. on alternate days (or sometimes daily) to a total of 59 to 84.5 cc. Solustibosan will cure kala azar and is relatively non-toxic. Solustibosan was tried in the treatment of 10 patients by NAPIER *et al* (p 181). It contains 20 mgm. antimony in 1 cc. and was given intramuscularly either daily or on alternate days to a total of 0.96 to 1.74 gm. antimony. All were probably cured. YATES (p 181) administers solustibosan to a total dosage of 80 cc. for every 100 lb. body weight. The daily dose may be increased and in 9 cases the course was completed in 5 days. In these progress was better than in those whose course was longer. Several adults were given injections of 20 cc. without showing toxic effects and in all, 95.1 per cent. of 82 patients were discharged improved.

HENDERSON (p 178) in the Sudan gives as a routine treatment a course of neostibosan followed by one or two courses of tartar emetic. Children respond readily. LAURINSICH (p 858) in Naples uses tartar emetic average number of doses 20 to 40 in infantile kala azar and the mortality is now only 6.35 per cent. in treated cases. The drug is given twice weekly. He considers that tartar emetic is more active than the organic antimony compounds.

D OELSCHITZ (p 869) uses ureastibamine for kala azar in the south of France and pushes it to the limit of tolerance so as to eradicate the infection by a single course and avoid producing antimony-resistant strains. Injections of liver extract appear to increase the tolerance to organic antimonials. The patient described by LEMIERRE *et al* (p 865) was successfully treated by ureastibamine after neostibosan had failed.

LE HULUDUT (p 182) obtained satisfactory results in kala azar with anthomaline. PANJA (p 878) treats post kala azar dermal leishmaniasis with concurrent pentavalent arsenic and antimony compounds.

PICOURY (p 872) notes the appearance of pustules breaking down to ulcers in dogs treated for kala azar by antimonials. *Leishmania* probably concentrated owing to the inflammatory reaction occur in the tissues of these ulcers.

Owing to the uncertainty as to the method of transmission of kala azar in the south of France, D OLESENITZ (p. 869) considers that the only available methods of prevention are the early identification and treatment of cases.

B CUTANEOUS LEISHMANIASIS.

Epidemiology

A translation by Hoare (p. 876) of a paper by BOROVSKY in 1898 establishes that the latter and his colleague SHULGIN in Tashkent were the first to recognize the parasite of oriental sore (known as Sart sore or Pendeh sore) to give an accurate description of its structure, to realize its protozoal nature and to suggest its transmission by a blood sucking intermediate host.

VIGNE and DURAN (p. 877) describe oriental sore in a man of 45 who had returned to Marseilles four months previously after a visit to Crete. HOVNASTAY *et al.* (p. 183) describe an outbreak of oriental sore in a newly constructed refugee camp near Aleppo. Sandflies abounded during the construction work and within a year the disease appeared in 181 individuals in 45 of 127 families. Seven acquired it for a second time but the attacks were mild. When the site was finally cleared the flies became less numerous and the incidence fell.

POGGI (p. 183) records cases of oriental sore in Abyssinian natives, and MORITI (p. 877) one in an Italian soldier in the same district. Certain nodular ulcerative or eczematous lesions in the south of the Cameroons suspected by HERVÉ (p. 877) as oriental sore, have now been proved by the discovery of leishmania. No evidence of visceral infection could be obtained.

Transmission and Pathology

ADLER (p. 860) shows that a Cretan strain of *L. tropica* (normally transmitted by *P. sergenti*) only with difficulty infected *P. papatasi* when the flagellate emulsion ingested was made up with 50 per cent. inactivated rabbit serum, but did so readily with 10 per cent. serum. A Palestinian strain (normally transmitted by *P. papatasi*) caused infection of *P. papatasi* readily regardless of the concentration of serum.

SINTOX (p. 863) produced oriental sore in a European whom he inoculated with serosanguineous fluid containing leishmania from an ulcer on the nose of a dog in the Punjab. A volunteer inoculated from this European also developed a papule in which leishmania were found. From experiments with volunteers, BERNIERIAUX (p. 863) concludes that *Stomoxys calcitrans* which readily feeds on oriental sores, is capable of transmitting infection mechanically and that it may possibly transmit visceral leishmaniasis in the same manner.

BOGLIOLO (p. 183) points out that the granuloma caused by *L. tropica* is at times indistinguishable from tuberculous lesions of the skin. EVANS (p. 878) found leishmania in nodules, which resembled tubercles, on the arm of a man in Irak. GONZALEZ *et al.* (p. 184) studied the lymphangitis which occurred in 12 per cent of cases of cutaneous leishmaniasis in Paraguay. Lymphadenitis is also present and the enlargement is due to proliferation of the reticulo-endothelial system with giant cell formation. Leishmania are constantly present.

Clinical.

BRUMPT (p. 879) describes a patient who had oriental sores on hand and foot and who developed complete blockage of the oesophagus.

This cleared under ureastibamine treatment and was probably one of the rare instances of mucous membrane involvement in oriental sore of the Old World.

Although cutaneous leishmaniasis in the Sudan resembles either post kala azar dermal leishmaniasis or oriental sore KIRK and DREW (p 877) find that there is no clear distinction between the distribution of kala azar and oriental sore such as has been observed in India.

GASPERINI (p 185) produced an allergic reaction with glandular enlargement by the injection of an antigen prepared from cultures of *L. donovani* in a patient showing ulceration of the lip YOUNG (p 184) describes an Indian woman with nodules and local anaesthesia of the skin regarded as leprosy until leishmania were found Tartar emetic ointment cured the condition

GONZALEZ and OLIVERA Y SILVA (p 183) describe cutaneous leishmaniasis in Paraguay

Treatment

MANSOY BAHR (p 879) found good results to follow the use of cignolin (a refined product of chrysophanic acid) in the treatment of oriental sore Cignolin paint (qv) may be applied daily to the sore and for the more chronic cases cignolin ointment (qv) is used.

RAYMOND (p 185) obtains the best results in oriental sore by thorough scraping under gas anaesthesia applying pure carbolic and covering with adhesive plaster or elastoplast for 14 days. When this is removed complete healing is found in about 90 per cent. of cases. Repetition may be necessary. HOLMES (p 185) also advocates this treatment but found that trivalent antimonials were also effective

C Wilcocks.

LEISHMANIASIS

PRÉCIS OF ABSTRACTS IN THIS SECTION

A Visceral Leishmaniasis

ABRAMOV (p 443) finds that kala azar occurs quite commonly in children and adults in certain highly malarious districts of Yugoslavia

ADLER *et al* (p 443) working in a town in Crete in which there were two centres one of kala azar and one of oriental sore found that *P. major* is the vector of the visceral disease and *P. sergenti* of the cutaneous Flagellates from *P. sergenti* produced oriental sore in a volunteer Canine kala azar is common in the areas of human disease and in measures for eradication both house and street dogs must be dealt with. Various sandflies are described.

AKAR (p 444) reports kala azar from Turkey ROBINSON (p 445) records the first case from Transjordan.

KIRK (p 445) concludes that leishmaniasis is endemic in certain areas of the Sudan sporadic in others. Visceral disease occurs in rural districts in the vicinity of water and vegetation but oral and cutaneous infections may be found in the same areas. Immigrants are more susceptible than indigenous natives *P. langeroni* is the only sandfly whose distribution bears relation to kala azar but the existence of some reservoir host is possible

SCHRETZKEMAYER *et al* (p 445) describe an outbreak in troops in Canton which was apparently introduced by men from an endemic area in the north. Jaundice was a feature in a number of patients. Treatment with neostibosan and solustibosan was successful. No investigation on transmission could be done.

CHAGAS *et al* (p 446) investigated visceral leishmaniasis in Brazil. The clinical features are those seen in the Old World. No infection was found in 1446 wild animals, but was discovered in 7 dogs and 1 cat. *P. longipalpis* was found. DA CUNHA (p. 447) re-emphasizes that the so-called *L. chagasi* cannot be differentiated from *L. infantum* or *L. donovani* and that it can produce infection in hamsters, monkeys and dogs. He also (p 447) demonstrated that these organisms are found to be identical by means of serological tests.

LOWE (p 447) shows that for growth, *L. tropica* and *L. donovani* like *T. cruzi* require ascorbic acid, haematin and an unknown substance present in serum. ARCHETTI (p 448) found that Reichenow's medium of citrated blood and Ringer solution, used in the cultivation of trypanosomes, is very suitable for the growth of leishmania. GARILLO and LAURENCIA (p 449) record success in cultivating leishmania in tissue cultures prepared from the embryo of the hamster.

FERRIRA *et al* (p 449) show that the parasite of S. American kala azar is able to develop in the sandfly (*P. intermedius*). These flies occur in and around the houses of patients. CHAGAS (p 449) succeeded in infecting laboratory bred *P. intermedius* and *P. longipalpis* from a dog with a skin lesion due to *L. chagasi*.

KRIEGER (p 449) concludes from experiments that serum antibodies htu to *L. donovani* *in vitro* have no curative properties *in vivo*.

CHRAID and POTINCO (p. 450) in the original paper summarize present knowledge of kala azar. VALLETTEAU DE MOUTILLAC *et al* (p 450) describe a meningeal syndrome which they regard as having been due to kala azar.

CHUNG (p 450) regards sternal puncture as the best method for diagnosing kala azar in hospitals, dispensaries and rural stations. The technique is given. DA CUNHA and DIAS (p 451) describe the preparation of alcoholic leishmania antigen for serological work.

DOLLEWITZ (p 451) details certain clinical features in kala azar and describes a treatment in which 34 gm. neostibosan was given during a period of 2½ months. DOLLEWITZ *et al* (p. 451) give the highest tolerated doses of antimony preparations continued over long periods in the treatment of kala azar. With ureastibamine, 0.5 cgm per kilo. body weight can be given daily until over half a gram per kilo. has been given but careful watch for intolerance is necessary. WAAG (p 452) finds that in experimental kala azar much more antimony can be given in the form of solustibosan than of neostibosan or ureastibamine but more is required for cure. MATTHEWSON and WATSON (p 452) treated a patient successfully with stibamine gluco-side (neo-tam) after failing with foudrin.

B Cutaneous Leishmaniasis

VIGAR (p 452) wrote a general account of oriental sore.

VASSI (p. 453) found 300 cases of oriental sore in Abruzzi in three months of 1938. *P. macdonovae* is probably the vector. ESNAULT and LOUBET (p. 453) report the first case of oriental sore seen in South Oran for 12 years.

HIGOUMENAKIS (p 453) considers that the parasite of oriental sore in endemic areas is actually that of kala azar which has lost virulence through many skin passages. Parasites from sporadic cases of oriental sore have retained much of their virulence and can produce visceral infections in animals.

SHALOM (p 454) points out that scars left by oriental sores may lead to ectropion and its complications. CAWSTON (p 454) describes a condition diagnosed as espundia in a Zulu.

PORTE (p 454) found that although local treatment was unsuccessful intravenous neostibosan rapidly produces cure. FLARER (p 454) injects a solution of atabrin into the skin round oriental sores and has thus cured 14 patients. CASTELLANI and AMALFITANO (p 454) use a fuchsin paint locally. Sores healed in 2 to 3½ months in three cases. REYES ORIBE (p 455) obtained very satisfactory results with large doses of foudadin combined with intravenous yatren in muco-cutaneous leishmaniasis.

C Wilcocks

ABRAMOV (G D) *Le problème du kala-azar chez l'adulte* [Kala Azar in the Adult.]—*Bull Office Internat d'Hyg Publique* 1938 Oct Vol 30 No 10 pp 2201-2206 With 2 figs.

Since 1933 cases of kala azar have been regularly encountered in Yugoslavia in the district lying between Lake Scutari and the Adriatic Coast. During the four years up to 1936 the disease has been diagnosed in 13 children and in 7 adults. During 1937 50 suspected cases were examined by means of blood films made from the lobe of the ear. In 16 of these leishmania were found. Of these 7 were children and 9 adults. In some cases diagnosis was established by the discovery of leishmania in scrapings from cutaneous ulcers which were present while in other cases positive cultures were obtained. It is evident that in the malarious districts where the observations were made kala azar occurs quite commonly amongst children and adults of all ages.

C M Wenyon

ADLER (S) THEODOR (O) & WITENBERG (G) *Investigations on Mediterranean Kala Azar XI. A Study of Leishmaniasis in Canea (Crete)*—*Proc Roy Soc Ser B* 1938 Aug 5 Vol 125 No 841 pp 491-516 With 3 figs [15 refs.]

Having established by a brief survey carried out in 1932 in Athens and the vicinity of Argos that the distribution of *Phlebotomus major* corresponded closely with that of kala azar and was therefore a probable vector of the disease it was decided to test this point more thoroughly by an intensive study of one locality. For this purpose Canea in Crete was chosen because it is a centre of both visceral and cutaneous leishmaniasis the two diseases however occurring in different parts of the town. Hagios Joannis a small district measuring 300 by 250 metres and situated at the south-eastern corner of the town accounted for 70 per cent. of the cases of kala azar. This small focus is about 1 kilometre distant from the old Turkish town which is practically free from the visceral disease though it is an intensive focus of the cutaneous infection. The most striking difference between the two districts is the presence of gardens and vegetation in the

where the disease had not previously been noted. The first case was diagnosed through the discovery of leishmania in a malaria patient. During the next five months a further 83 cases were identified. They were all in officers or soldiers except three which were in women who however had been employed by the military authorities. A number of the cases were in men who had never left the Canton district, while others were in soldiers who had come from \ China, where the disease is endemic. It seems clear that the infection had been introduced with these men from \ China.

The disease appeared to follow the usual course though association with malaria or other infections was common. In 24 of the cases jaundice was a feature. In one case there supervened a condition of acute atrophy of the liver. As regards treatment, neostibosan or solistibosan was employed with good results in most cases. Three of the patients died as a result of serious complications.

Observations on dogs and sandflies in this area have not yet been carried out, but attempts to do so will be made as far as the exigencies of war permit.

C M H

CRAGAS (E.) DA CUNHA (A. Marques) FERREIRA (L. Castro) DEANE (L.) DEANE (G.) GUIMARÃES (F. \) VON PAUMGARTEN (M. J.) & SÁ (B.) Leishmaniose visceral Americana. (Relatório dos trabalhos realizados pela comissão encarregada do estudo da Leishmaniose Visceral Americana em 1937) [Report of American Kala Azar Commission for 1937]—*New Inst Ostraldo Cruz.* 1938. Vol. 33 No 1 pp. 89-229 With 12 maps & 40 plates.

This lengthy report deals with a study of kala azar which was carried out in the municipality of Abaeté in the State of Pará, Brazil, where during 1937 eight cases of the disease were discovered. The investigation involved the study of the cases clinically a morphological and experimental investigation of the causative organism and a detailed epidemiological survey including the collection and examination of large numbers of insects and vertebrates of all kinds. Of the eight human cases seen, seven were in children, while one was in an adult. These do not appear to have revealed any features which have not been recognized in the well known kala azar of the Old World. The examination of captured wild animals 1448 in number brought to light no cases of infection, but amongst domestic animals, 7 dogs and 1 cat were found infected. A very large number of biting insects of all kinds were collected. There were mostly mosquitoes but *Phlebotomus longipalpis* was captured on a number of occasions. All the details of the animal and insect examinations and the relationship of the human cases to the general population of the district are given in a series of comprehensive tables, maps and charts. A number of photographs shows the type of dwelling in which the cases occurred. These are mostly isolated thatched wooden huts standing alone amongst trees and scrub in, or at the margin of, the forest.

The whole investigation, judging from the mass of detail in the report was carried out with the utmost care and thoroughness and though nothing very new has come to light, the material thus made available may be of great service to future observers.

C M H

- i. DA CUNHA (A. Marques) Infections expérimentales obtenues en partant de la leishmaniose viscérale américaine. [Experimental Infections with S American Visceral Leishmaniasis.]—*C R Soc Biol* 1938 Vol. 129 No 27 pp 428-430
- ii ——— Infecções experimentais na leishmaniose visceral americana. [Experimental Infections with S American Visceral Leishmaniasis.]—*Mem Inst Oswaldo Cruz* 1938 Vol. 33 No 4 pp 581-598 With 9 plates. English summary

1. In a previous communication the author and E. CHAGAS (this *Bulletin* 1937 Vol. 34 p 569) reported the failure to infect animals with the parasite of S American kala azar. Further experience has shown the author that such infections can readily be produced if younger cultures of leishmania than those previously employed are used for inoculation. Up to the date of writing successful infection of hamsters (*Cricetus cricetus*) macaques and dogs has been effected the last however only after injection of leishmania derived from naturally infected dogs. In the case of the hamsters there was a tendency to swelling of the feet while the skin of the abdomen became roughened erythematous and friable. Apart from these features the infections in the animals were similar to those produced by the parasites of kala azar from other countries. The successful infection of animals with *Leishmania chagasi* the name given to the parasite of S American kala azar which however cannot be differentiated from *L. infantum* or *L. donovani* has already been reported by the author himself and by ADLER (this *Bulletin* 1938 Vol. 35 p 875).

ii In the second paper further details of the infections produced are given while it is recorded that one dog had been infected with cultures of a human strain of the South American parasite. It is again emphasized that the parasite is identical with *Leishmania infantum* C M II

DA CUNHA (Aristides Marques) A aglutinação e o diagnóstico diferencial das leishmanias. [Agglutination and Differential Diagnosis of Leishmanias.]—*Brasil Medico* 1938 Sept 17 Vol. 52. No 38 pp 849-855

The author has carried out a number of serological tests with strains of *Leishmania donovani*, *L. infantum*, *L. tropica*, *L. brasiliensis* and the leishmania of the recently discovered S American kala azar for which the name *L. chagasi* has been suggested. His procedure has been to prepare in rabbits agglutinating sera for all the strains by injection of culture forms of the organism. With these sera and cultures of the various strains absorption tests were made. The results of these are given in a series of eleven tables. The outcome has been that the author has come to the conclusion that the parasite of S American kala azar is identical with that of the Mediterranean disease which bears the name *L. infantum* C M IV

LWOFF (Marguerite) Le pouvoir de synthèse des leishmanies. [The Synthetic Power of the Leishmanias.]—*C R Soc Biol* 1939 Vol. 130 No 5 pp 406-408

The author has already shown that blood necessary for the cultivation of *Trypanosoma cruzi* contains three essential substances

of which two have been identified. These are haematin and ascorbic acid. The unknown substance is contained in the serum. As regards leishmania, most observers agree that blood is an essential constituent of all media which permit continued cultivation. The author finds that certain species of leishmania will not grow in peptone media containing serum alone, or washed red blood corpuscles alone, but that when both are present good growth occurs. The serum contains an unknown factor but the washed red blood corpuscles contain haematin and ascorbic acid. Two species *L. cerasiodactylis* and *L. agamas* both parasites of lizards, will grow perfectly well in peptone media to which haematin and serum has been added, whereas two strains of *L. tropica* and one of *L. donovani* required in addition ascorbic acid and thus have the same requirements as *T. cruzi*. It may be that the two lizard leishmania do not require ascorbic acid. On the other hand it is possible that minute traces of this substance, or of some related substance were actually present in the medium and that the differences noted between the different leishmanias are quantitative rather than qualitative as regards their need for ascorbic acid. One fact is clear namely that all the trypanosomidae, whether parasites of animals or plants require haematin. Furthermore some of the more highly specialized forms like the trypanosomes of vertebrates and particularly those which have two hosts need in addition ascorbic acid and one or more unknown substances which are contained in serum.

C M IV

ARCHETTI (Italo) Ein einfacher Nährboden für Leishmanien. [A Simple Medium for Leishmania].—*Arch f Schiff's u Trop Hyg* 1938. Dec. Vol. 42. No. 12. pp 547-549

The author has found that the medium employed by REICHENOW for the cultivation of trypanosomes is very suitable for the growth of leishmania. It is prepared as follows. Into a pointed centrifuge tube are introduced 1 cc. of citrated human blood (0.5 cc. of citrate solution and 0.5 cc. of arm blood) and 1 cc. of Ringer solution. The tube is then kept in the ice chest till the cells have settled to form a layer of red blood corpuscles covered by a layer of leucocytes. In this medium the leishmania multiply in the leucocyte layer where large numbers of flagellates free and in rosettes are found.

C M IV

GAVERILOV (W) & LAURENCEK (S) Application d'une méthode de culture de tissus à l'étude des protozoaires. [Application of a Tissue Culture Method to the Study of Protozoa].—*Ann Soc Belge de Méd Trop* 1938. Mar 31. Vol. 18. No. 1. pp 41-56. With 13 figs. on 7 plates. [13 refs.]

In this article the authors describe the successful cultivation of leishmania in tissue cultures prepared from the embryo of the hamster. The cultures were made up with heparinized blood, embryonal fluid and extract of spleen. To a mixture of these ingredients the embryonal tissue to be cultivated was added. The culture when established was inoculated with cultural forms of leishmania. It was possible to trace the penetration of the flagellates into the cells, their development into rounded leishmania forms and their multiplication. The various appearances are shown in a number of macrophotographs of the infected tissue cultures.

C M IV

FERREIRA (L. Castro) MANGABEIRA (O) DEANE (L.) & CHAGAS (A W) Notas sobre a transmissão da leishmaniose visceral americana. [Transmission of American Visceral Leishmaniasis].—*Hospital* Rio de Janeiro 1938. Nov. Vol. 14 No 5 pp 1077-1087 With 16 figs.

In this preliminary report the authors describe experiments which they have carried out with sandflies (*Phlebotomus intermedius*) and S American kala azar. It has already been reported that in the Eastern part of Brazil where endemic foci of kala azar exists dogs and a cat as well as human beings have been found infected. Collecting sandflies which were observed to have fed on an infected dog and dissecting them some days later it was shown that development of leptomonads had occurred in the intestine of some of them. It is thus evident that the parasite of S American kala azar is able like other forms of leishmania to develop in sandflies.

It is shown that the sandflies occur in and around the houses of kala azar patients while their breeding places have been located near these houses. It was possible to breed the flies in the laboratory and something of the technique employed for this purpose is described. Laboratory bred sandflies fed on an infected dog have so far failed to acquire an infection. The paper is illustrated by a number of photographs depicting breeding places of the flies the apparatus used for laboratory rearing of flies and other features of the work which is being continued.

C M W

CHAGAS (A W) Infecção de *Phlebotomus intermedius* pela *Leishmania chagasi*. [Infection of *P. intermedius* with *Leishmania chagasi*].—*Brasil Medico* 1939 Jan 7 Vol. 53 No 1 pp 1-2. With 2 figs.

Previous observations noted in papers reviewed in this number have shown that the parasite of S American kala azar will undergo development into leptomonads in both *Phlebotomus longipalpis* and *P. intermedius*. These facts were ascertained by dissection of wild flies after they had fed on naturally infected dogs. In the present paper are described experiments with laboratory bred flies fed on an infected dog which revealed a skin infection with leishmania. Both *P. intermedius* and *P. longipalpis* were infected in this way.

C M W

CALCUTTA ANNUAL REPORT OF THE ALL INDIA INSTITUTE OF HYGIENE AND PUBLIC HEALTH 1937 [LAL (R B) Director]—[Kala Azar p 25 KRISHNAN (K V)]

Normal human serum and serum from cases of kala azar have *in vitro* a lytic action on cultural forms of *Leishmania donovani*. These sera as also that of rabbits immunized with a leishmanial vaccine do not influence in any way the course of infection in mice produced by the inoculation of emulsion of heavily infected hamster spleens. Immune serum and neostibosan administered repeatedly to infected mice failed to bring about a cure. From these observations it appears that antibodies act on leishmania only *in vitro* and that their presence *in vivo* does not help in bringing about a cure.

C M W

GIRAUD (Paul) & POINÇO (Robert) Diagnostic et traitement de la kala-azar méditerranéenne de l'enfant et de l'adulte. [Diagnosis and Treatment of Mediterranean Kala Azar in the Child and the Adult.]—*Marseille Méd.* 1933. July 5-15 Vol. 75 No. 19-21 pp. 75-82.

This is a general account of kala azar based on 155 cases in children and adults seen in the south of France. It contains nothing new but a good summary of present-day knowledge of all aspects of the disease.

C. M. II

VALLETTEAU DE MOUILLAC DELISCOUET & DELACOUX DES ROSEAUX Syndrome méningé au cours de la leishmaniose infantile. [Meningeal Symptoms in Infantile Kala Azar]—*Arch. Méd. et Pharm.* Nov. 1933 July-Aug-Sept Vol. 129 No. 3 pp. 760-768.

The case described was a typical one of kala azar in a child of four years, the disease having apparently been contracted in Cherbourg where it is becoming increasingly common. Treatment with neostibosan was instituted, it being the intention to give three courses with intervals of fifteen days between them. The response to the first course was immediate and satisfactory but a day or two before the second course was commenced there was fever and later symptoms of meningitis on account of which the second course which had been commenced was discontinued. Lumbar puncture yielded a purulent cerebrospinal fluid under pressure. The cells chiefly polynuclear and lymphocytes, were so numerous as to be uncountable. As a precautionary measure 30 cc. of antileishmanogenic serum was administered. It was found, however, that the fluid was bacteriologically sterile while guinea-pig inoculations failed to reveal any tubercular infection.

A second lumbar puncture gave a fluid with fewer cells while at a third a perfectly clear fluid was obtained. The meningeal symptoms disappeared and the course of antimony treatment was resumed. There was no further mishap and the third course was given without any reaction the child making a complete recovery. The origin of the meningitis is discussed and it is regarded as a rare and unusual manifestation of the leishmanial infection.

C. M. II

CHUNG (Huei-lan) A Sternal Puncture Technique and Its Clinical Value with Especial Reference to Its Usefulness in the Diagnosis of Kala-Azar.—*Chinese Med. J.* 1933. Nov. Vol. 54 No. 5 pp. 397-408. With 4 figs. on 2 plates. [13 refs.]

Since 1936 at the Peiping Union Medical College it has been the custom to practise sternal puncture for the diagnosis of kala azar or the study of the bone marrow cells. In all 350 such punctures have been made and kala azar diagnosed 171 times. The author is convinced that sternal puncture is the best method for diagnosing kala azar in hospital, dispensaries and rural stations. After considerable experience the author has found that the best procedure is to use a shortened lumbar puncture needle which is inserted in the mid line at an angle of 30 or 40 degrees at the level of the upper half of the second or third intercostal space. The needle with the stylet in it, is pushed with a boring action through the anterior lamina. When the marrow cavity is reached the stylet is removed and a syringe for aspiration attached.

to the needle. In the author's experience a local anaesthetic (novocain) is seldom necessary except with nervous individuals or patients over 30 years of age whose sternal cortex is usually thick and hard.

C M II

DA CUNHA (A. Marques) & DIAS (Emmanuel) Reacção de fixação do complemento nas leishmanioses. [Complement Fixation in the Leishmaniasis.]—*Brasil Medico* 1939 Jan Vol. 53 No 5 pp 89-92.

The authors have prepared a leishmania antigen by the following technique. The parasites are grown on the surface of blood agar plates for 8 to 15 days. The growth is scraped off and washed twice in physiological saline following which the centrifuged deposit of leptomonads is shaken up with ten volumes of acetone. After one or two days the acetone is removed and the sediment dried completely at 37°C. The material is then triturated and weighed. To it is then added 1 cc of absolute ethyl alcohol for each centigram and the mixture placed at a temperature of 37°-40°C for 20 days. The alcoholic antigen which is then of a brown colour may be kept at ordinary laboratory temperature or in the cold.

C M IV

D OELSNITZ. Le traitement d'attaque du kala azar [Intensive Treatment of Kala Azar]—*Bull et Mém Soc Méd Hôpît de Paris* 1939 Mar 6 55th Year 3rd Ser No 7 pp 321-324

The case described is one of kala azar in a chamber-maid twenty five years of age. The disease was apparently contracted in Nice. Treatment was carried out with neostibosan which was administered almost daily for about two and a half months in doses of 0.5 gram till a total of just over 34 grams had been given. A complete cure resulted. The author notes particularly that this case illustrates certain features of the disease in adults to which he has called attention on a number of occasions. These are the slow development of the disease in a series of remissions and relapses the character of the anaemia, the changes in hepatic function the cutaneous pigmentation, the menstrual disturbances the frequency of adenitis of the epitrochlear glands and the course of development of the various biological reactions.

C M IV

D OELSNITZ SAURIN RAUBAUDI & DANIEL. Un nouveau cas autochtone de kala azar de l'adulte [Endemic Kala Azar in an Adult.]—*Bull et Mém Soc Méd Hôpît de Paris* 1939 Mar 6 55th Year 3rd Ser No 7 pp 316-321

The authors remind readers that during the last seventeen years in the South of France they have had under their care 150 cases of infantile and 15 cases of adult kala azar. They trace the development of their ideas regarding the best form of treatment till they reach the procedure which they now adopt namely the administration as frequently as possible of the highest tolerated doses continued over a long period. In the case of ureastibamine a dose of half a centigram per kilogram of body weight can be given daily till a total of over half a gram per kilo of body weight has been administered. During this

intensive treatment a careful watch has to be kept for signs of intolerance. With other organic antimony compounds the above doses may be exceeded.
C M W

WANG (C W) Solustibosan and Ureastibamine in Treatment of Kala Azar in Chinese Hamsters.—*Proc Soc Experim Biol & Med* 1938. Dec. Vol. 39 No 3 pp 418-421

The author has tested the toxicity and therapeutic value of solustibosan to normal hamsters and to hamsters suffering from experimental kala azar and has compared it with neostibosan and ureastibamine. In terms of the antimony content much more can be given in the form of solustibosan than in the form of either of the other two drugs, ureastibamine being the most toxic. As regards infected animals much more antimony in the form of solustibosan was required to bring about a cure than either of the other two. In this respect, ureastibamine is the most and solustibosan the least potent of the three drugs. During the tests on infected animals more of them died after ureastibamine than after solustibosan, but this was the result of the greater ulceration caused by the first of these, both drugs being given subcutaneously owing to the impossibility of carrying out intravenous injections in hamsters.
C M W

MATHIESON (Don R.) & WATSON (B. A.) Kala Azar.—*Jl Amer Med Assoc* 1909 Jan. 28 Vol. 112 No. 4 pp 308-309 With 2 figs.

The case described is that of a Chinese student who was found to be suffering from kala azar after he had gone to the United States. He was treated with fousadin given intramuscularly on alternate days till 125 mgm. had been given. As this drug did not appear to be controlling the disease it was decided to try stibamine gluconate (neostam). A total of 2.08 gm. was administered (presumably intravenously) in forty three days. A complete recovery occurred. During the fousadin treatment the patient's condition became so desperate that the treatment was stopped. The day following, the patient's temperature fell dramatically and his condition

VANNI (Vittorio) Ricerche sulla leishmaniosi cutanea endemica negli Abruzzi. Nota preventiva. [Researches on Endemic Cutaneous Leishmaniasis in Abruzzi.]—*Ann d'Igiene* 1938. Sept-Oct Vol. 48 No. 9-10 pp 520-528. With 7 figs.

Oriental sore has already been reported as common in the Province of Abruzzi on the East coast of Italy. The author reports that in the three months May to July 1938 he encountered there about 300 cases. These occurred mostly in the coastal rural districts with the exception that cases were less common on either side of the rivers which run from west to east through the province. Sandfly collections revealed two species *Phlebotomus macedonicus* and *P. papatasi*. In sections of a specimen of the former species it was seen that the pharynx was packed with flagellates which had the structure of leptomomas. It seems clear that these represent developmental forms of *Leishmania tropica* and that this sandfly is a vector of oriental sore in the district.

C M W

ESVAULT (P) & LOUBET (R.) Sur un nouveau cas de bouton d'Orient observé dans le Sud oranais. [A Fresh Case of Oriental Sore in South Oran.]—*Arch Inst Pasteur d'Algérie* 1938 June Vol. 18 No 2. pp 210-212. With 1 plate

The case described is a typical one of oriental sore in a young Arab who contracted the disease in the South Oran district of Southern Algeria. The interest of the case lies in the fact that it is the first to be seen in this area for 12 years though medical men have been constantly in the district attending to the needs of the inhabitants. The last cases five in number were seen by CÉARD in 1924-1925 so that it would appear that for some unexplained reason the disease occurs in small outbreaks separated by long intervals of time

C M W

HIGOUMENAKIS (G. H.) Beitrag zur Studie der Beziehungen zwischen Haut und Eingeweide-Leishmaniose (Orientbeule und kala-azar). [Relation between Oriental Sore and Kala Azar.]—*Arch f Dermat u Syph* 1938 Oct 20 Vol. 178 No 2. pp 133-151 With 7 figs. [23 refs]

The author gives a detailed account of several atypical cases of oriental sore in Greece which he regards as new types of the disease. The lesions in these cases were multiple and were of long duration. In one case there was a history of 15 years. In a case of kala azar in a child there appeared a number of skin lesions resembling oriental sore. Though leishmania were not found in these it is concluded that they were cutaneous manifestations of the generalized infection. This case leads the author to discuss the general question of the relationship of oriental sore to kala azar. He favours the view that the parasite of oriental sore in endemic foci of the disease is actually that of kala azar which through many skin passages has decreased in virulence and has thus ceased to produce generalized infections. The parasites from sporadic cases of the disease have, however, retained much of their virulence as evidenced by their power of producing visceral infections in experimental animals. This long and somewhat discursive paper is illustrated by a series of excellent photographs showing the types of lesion described.

C M W

SHALOM (E.) Effects of Scars of Baghdad Boils of the Lids.—*Jl. Egyptian Med Assoc.* 1939. Oct. Vol. 21 No. 10 pp 678-680.

The author writing from Baghdad, points out that the scars left by oriental sore of the eyelid may lead to ectropion and the various conjunctival and corneal complications which may follow this condition. In severe cases these may lead to blindness. C M IV

CAWSTON (F Gordon) Ulcero-Granulomatous Affection of the Nose in Zululana.—*South African Med J.* 1939. Nov. 26. Vol. 12. No. 22. pp. 854-855. With 1 fig

The case described is that of a Zulu man 30 years of age who was suffering from a condition which had developed since childhood and had finally destroyed the whole upper jaw nose septum and left eye, exposing the uvula and epiglottis. The condition was diagnosed as espondia, though no leishmaniasis could be found. Improvement in general health and in hearing which had been affected, followed a series of antimony injections C M IV

PORTER. La médication stibite dans le traitement du clou de Biskra. [Antimony Treatment for Oriental Sore].—*Ann de Méd et de Pharm Colon* 1939. July-Aug-Sept. Vol. 96. No. 9 pp 731-732

Oriental sore is relatively common in Algeria, particularly in the palm groves between Biskra and Tougourt where it is known as "clou de Biskra". Local treatment has done little to influence the duration of the sores, which eventually heal spontaneously. Certain antimony derivatives, such as the pentavalent diethylamine-aminophenyl stibonate (neostibosan) administered intravenously bring about a rapid cure. Generally an injection of 10 centigrams followed by one of 20 centigrams and then five of 30 centigrams, the injections being given twice a week are enough to bring about healing of the sore in a short time. C M IV

— ARER (Franco) Nuovo metodo di cura per la leishmaniosi cutanea (bottom d'Oriente) [New Cure for Oriental Sore].—*Boll Istituto Siroterap Milanese* 1939. Aug. Vol. 18 No. 8. pp 469-473. German summary (10 lines)

The author states that solution of atabrin injected into the skin round oriental sores rapidly destroys the parasites and cures the disease. The dose administered at one sitting commences at 0.05 to 0.1 gram dissolved in 1 or 2 cc. of distilled water and is increased at subsequent sittings to 0.3 gram. In some cases only a single injection was required to bring about a cure which has been effected in 14 cases. C M IV

CASTELLANI (Aldo) & AWALFITAKO (G) Treatment of Oriental Sore (Leishmaniasis Cutanea) with Fuchsin Paint.—*Jl Trop Med & Hyg* 1939. Feb. 1. Vol. 42. No. 3 pp 33-34. With 2 figs.

The authors have treated three cases of oriental sore with a fuchsin paint prepared as follows. Saturated alcoholic solution of basic

fuchsin 10 ml. 5 per cent phenol solution 100 ml filter and add boric acid 1 gram and two hours later acetone 5 ml two hours later resorcinol 10 grams is added. The mixture is kept in a dark-coloured stoppered bottle. The sore is cleared of scab and scales by moist dressing of boric acid and resorcinol applied for two days. The fuchsin paint is then applied twice daily to the sore while 2 c.c. of the same solution is given intramuscularly every other day. The solution may also be injected into the nodule or around it. Presumably the solution referred to is the paint itself but whether this is so is not quite clear. Three cases all from Africa, were treated the sores healing in two to three and a half months. *C M W*

REYES ORIBE (Hector) *Leishmaniosis tegumentaria americana. Modificaciones en el tratamiento asociación Yatren Fuadina. (Tratamiento Mazza.) [Yatren-Fouadin Treatment of S American Cutaneous Leishmaniasis.]—Prensa Méd Argentina 1938. Dec. 28 Vol 25 No 52. pp 2465-2475 With 6 figs. English summary*

In this article the author discusses a number of remedies which have been employed for the treatment of muco-cutaneous leishmaniasis in S America. These have not given very satisfactory results and he himself has been disappointed in the therapeutic effect of various antimonials. Accordingly on Professor Mazza's suggestion, he combined treatment with large doses of fouadin with intravenous injections of yatren. This was administered in a daily dose of 2 cc of a 3 per cent solution till 40 to 60 cc. had been given. The results of this combined treatment are described as being excellent. *C M W*

TROPICAL OPHTHALMOLOGY

A REVIEW OF RECENT ARTICLES. XXXI*

Conjunctiva—The nature of the epidemic of ophthalmia which raged in Europe during the Napoleonic campaign and after the return of the French and British troops from Egypt has always offered material for discussion. LAW¹ after a comprehensive review of the literature concludes that though trachoma was well known in Western Europe before the Egyptian campaign yet a consideration of the history of the disease suggests that much of the subsequent infection was brought from Egypt. The troops were also heavily infected with gonorrhoeal ophthalmia. [The description of the epidemic by Larrey Napoleon's surgeon-in-chief quoted by the author points to the existence of diverse causes—keratomalacia being one of them.]

Spring Catarrh—LYONS² has made a careful study of vernal catarrh in Egypt. The essential feature of the disease is an intermittent

* For the 30th of this series see Vol. 35 pp 855-857

¹ LAW (Frank W.) Egyptian Ophthalmia. —*Brit Jl Ophthalm* 1939 Feb Vol. 23 No 2. pp. 81-83 [11 refs.]

² LYONS (F Maxwell) The Biomicroscopy of Spring Catarrh.—*Tweefik Ann Rep Memorial Ophthalmic Laboratory, Giza, Cairo 1937 Appendix No 2 pp 1-13 With 6 coloured plates & 4 figs. [12 refs.]*

exudation of fibrin and wandering cells from certain groups of the conjunctival capillaries. This exudation may occur from the new formed vessels in trachomatous pannus as well as from the normal subconjunctival capillaries. It is likely to be best marked in areas where there is little mechanical resistance to leakage as in the interpalpebral portion of the bulbar conjunctiva. The tarsal conjunctiva, being firmly bound by fibrous bands to the tarsal plate is unable to accommodate the exudation, which consequently exudes through the epithelium and forms a sticky film on the surface. The epithelial layer soon becomes uprooted at the points of its weakest attachment and is ballooned out into broad papillae which undergo vascularization. The author minutely describes the corneal changes induced by exudation from the vessels of the limbus and of any existing trachomatous pannus. Early symptoms of the disease are (1) a general sallow appearance (2) a sensation as if something was crawling beneath the lid (3) a brilliant surface sheen of the conjunctiva with an opalescence of the tissues (4) a local eosinophilia combined with a tacky fibrinous discharge.

Purulent Ophthalmia—FERRÁNDEZ³ has reported strikingly successful results in eight cases of gonorrhoeal ophthalmia from the use of sulphamidamide, 2.6 gm. of the drug was administered daily for the first three days in four evenly-spaced doses of 0.65 gm. On the fourth day one dose was omitted so that the total amount on that day was 1.65 gm. The last two patients received no local treatment and were treated with sulphamidamide exclusively yet they recovered just as rapidly as the others.

Trachoma—Events during the past twenty years have led to a considerable increase in the incidence of trachoma in Greece in some localities this is as high as fifty per cent. according to CONSTATOS and CHARANIS⁴. These authorities review the measures taken and to be taken to control the disease. A special trachoma section of the Ministry of Health and Public Assistance was instituted ten years ago this works in cooperation with the departments of Education War and Admiralty. The school index method will mostly be employed.

fect foci of infection and the campaign will then be on a broad basis. About one hundred dispensaries will be opened and the staff for these will be trained in four or five months in the large towns. Special provision for trachomatous orphans and special companies in the army will be made in the General Hospitals and in the factories throughout the country. A 100-bed Home for trachomatous orphans and special companies in the army will be instituted for trachomatous soldiers. The programme will last for five years and will cost about twenty million drachmae. The Cross Society started a trachoma dispensary in 1925 in the infected district of Laurium, and in 1931 opened a dispensary in Athens under the direction of Dr J. S. CHARANIS. This confirms the claim made by KELLER that a close connexion

exists between trachoma and gonorrhoea. (J. S. CHARANIS & FERRÁNDEZ (Ricardo F.) Sulphamidamide in Gonorrhoeal Ophthalmia. Preliminary Report—*Ann J. Ophthalmol.* 1933 July 1933. No 7 pp 763-766 With 1 fig.

(Lefebvre F.) & CHARANIS (Jean S.) La lutte contre le trachome en Grèce. *Internat du Trachome* 1933 Oct. Vol. 15 No 4. With 6 figs.

The authors have prepared a proposal of symptoms of trachoma décrits par Keller. *Internat du Trachome* 1933 Oct. Vol 15 No 4. 9 refs.]

exists between trachoma and syphilis. He considers that though the diseases more or less often may be associated yet they are not necessarily so. Trachomatous pannus certainly exists and it cannot be mistaken for interstitial keratitis. Should an individual suffer from both syphilis and trachoma general treatment will act on the syphilis and the trachoma will be ameliorated. The follicle in trachoma differs from that in folliculosis in that it yields to crushing and leaves a cicatrix this is claimed to be a pathognomonic characteristic. The dissemination of the disease in the French Colonies is described by MARQUE⁶ who states that it is almost unknown in the small colonies and is rarely seen in Madagascar. It is however very common in Indo-China and most prevalent in the African Colonies. The author describes the disease and the organization necessary for its suppression. Much of the latter however involves greater expense than the colonies can afford and attention should in the first place be directed to improvement of rural hygiene propaganda, and education of the local practitioner in dealing with trachoma.

JULIANELLE SORY SMITH and LANGE⁷ have experimented with tartar emetic in the treatment of trachoma and have described their technique and results. The character of the latter leads them to conclude that the drug may possibly be of some use in certain varieties of the disease. The benefit seemed to be most marked in cases with corneal complications and in those which had been subjected to graftage. As might be expected sulphanilamide has been fairly extensively tried in the treatment of trachoma. KIRA McKELVIE & HUSSEIN⁸ report favourable results in the Sudan and found it particularly beneficial when corneal complications were present. They state that compared with present methods of treatment sulphanilamide therapy is simpler and much less painful but its permanent effectiveness has still to be ascertained. LOE⁹ has used the drug in the case of 140 patients and says that his experience has made him extremely sanguine. GRADLE¹⁰ has also had good results in 41 patients and thinks it may prove a new means of combating the more acute stages. He states that the drug is not free from danger and should only be employed when medical observation every twenty four to forty-eight hours is possible.

Cataract—The influence of general nutrition in the causation of cataract has been discussed by YUDKIN¹¹. He concludes that the disease is unlikely to be due to any single factor but is produced by many conditions a disturbance of the general metabolism being one of the most important. The prescription of a well-balanced diet properly supplemented with vitamins must play an important part in the prevention and treatment of the disease.

⁶ MARQUE. Le trachome dans les colonies françaises.—*Les Grandes Endémies Tropicales* 1938. Vol 10 pp 88-114.

⁷ JULIANELLE (L. A.) SORY (R.) SMITH (J. E.) & LANGE (A. C.) The Effect of Tartar Emetic on the Course of Trachoma. A Preliminary Report.—*Amer Jl Ophthalm* 1938 June. Vol 21 No. 6. pp 651-657.

⁸ KIRA (R.) McKELVIE (A. R.) & HUSSEIN (Hussein Ahmed) Sulphanilamide in the Treatment of Trachoma.—*Lancet* 1938. Oct. 29 pp 994-995.

⁹ LOE (Fred) Sulfanilamide Treatment of Trachoma. Preliminary Report.—*Jl Amer Med Assoc* 1938 Oct 8 Vol 111 No. 15 pp 1371-1372.

¹⁰ GRADLE (Harry S) [Discussion of above paper]—*Jl Amer Med Assoc* 1938. Oct. 8. Vol 111 No 15 p 1372.

¹¹ YUDKIN (Arthur M.) Diet and Vitamins in Relation to Cataract.—*Amer Jl Ophthalm*. 1938 Aug Vol. 21 No 8 pp. 871-881 [14 refs]

vaccines. Good results are obtained and the virus in the dried faeces remains active for as long as one year.

JORDAN and FLETCHER (p. 472) note that if 4 per cent. of ammonia is added to a local cresylic disinfectant it destroys lice and eggs in one hour.

ZIA and LIU (p. 472) point out the dissimilarity between the agglutinin production for *Rickettsia* and the Weil-Felix reaction in *Uyospalax fontanieri* infected with typhus virus.

PIERI (p. 472) reviews the history of boutonneuse fever. OLMER and OLMER (p. 473) consider that although the virus of boutonneuse fever is most closely allied to that of Rocky Mountain fever (and less so to the others of the typhus group) it is distinct. BOISSEAU (p. 473) inoculated himself with the virus of boutonneuse fever and describes the course of the local lesion and general disease.

GIBBONS (p. 474) shows that Rocky Mountain fever has been endemic in Western Canada since 1917 but no evidence of infection was found in 30 000 ticks collected.

PILCHER (p. 474) records cases of Rocky Mountain fever in Massachusetts. FLIPPER (p. 474) discusses typhus in Pennsylvania. JORDAN (p. 475) notes that 32 of 38 cases of Rocky Mountain fever reported in Iowa occurred in rural areas and most were associated with dogs heavily infested with *D. variabilis*. This tick was proved to harbour the virus in certain localities. BISHOPP and SMITH (p. 475) describe the bionomics of *D. variabilis* the principal, if not the only vector of Rocky Mountain fever and a vector of other diseases. Low relative humidity is probably the most important limiting factor. Various mammals may be infested but the dog is the main host. Methods of control are given. The abstract cannot be summarized further.

BRIGHAM (p. 477) shows that endemic typhus virus can be maintained in the numerous native field mice of Alabama, and (p. 477) details a number of wild rodents susceptible to endemic typhus virus in the same area. DAVIS and PARKER (p. 477) found that cross immunity tests of two strains of virus of Rocky Mountain fever of two different serological types in man, failed to show immunological differences in rabbits.

DIAS (p. 477) uses the term Brazilian spotted fever for the endemic typhus of São Paulo and Minas Geraes. The serological reactions and the fact that it is transmitted by ticks of the *Amblyomma* genus show the similarity to Rocky Mountain and boutonneuse fevers. TRAVASSOS (p. 478) shows that dogs may form a reservoir of endemic typhus and that this is transmissible by *Amblyomma striatum* in São Paulo. DE MAGALHÃES (p. 478) succeeded in infecting guinea-pigs with typhus by naturally infected *Amblyomma cayennense* in Minas Geraes, and (p. 478) describes the pathological appearances found in man.

GUNTHER (p. 478) considers that the vector of the endemic typhus of New Guinea (which resembles tsutsugamushi fever clinically and serologically) is a mite either a rare species or a rarely infected common species. HEINEMANN (p. 479) reports three cases of a second infection with pseudotyphus in the Dutch East Indies. The intervals between infections were from 1 to 2½ years, and little if any immunity is developed.

DAVIS *et al.* (p. 479) discovered infection with a new virus probably similar to that of Q fever of Australia in specimens of *D. andersoni*.

in Montana. The virus passes Berkefeld N and W filters but not a Seitz disc. Various rodents could be infected but no protection was given against Rocky Mountain virus. Transmission by nymphs and adult ticks developed from infected larvae was proved and eggs of infected adults developed to infective larvae. Rickettsia-like bodies were constantly found but were very slender and resembled *Bartonella bacilliformis*. The virus is cultivable in tissue culture. There is no cross immunity with Rocky Mountain fever.

ARCHER (p. 481) isolated *Proteus inuar* from a laboratory mouse

C B

LECCISOTTI (G). La Weil Felix nella popolazione murina di Taranto [The Weil Felix Reaction in the Rats of Taranto].—*Pathologica* 1938. Dec 15 Vol. 30 No 566 pp 522-524. English summary (3 lines)

The author tested the serum of 93 rats (55 *Mus decumanus* 35 *Mus rattus* and 3 *Mus musculus*) caught in Taranto. Three strains of *Proteus* were used, *Felix Siniaco* and *Mel.* Forty-seven sera (39 *decumanus* and 8 *rattus*) were positive to a dilution of 1 in 100.

The author points out that these rats act as reservoirs and may transmit to man by their fleas mild endemic typhus of the nature of Brill's disease. But since according to certain workers the virus of murine typhus may give rise to classical human typhus the importance of this rat reservoir in a Mediterranean port is obvious. C B

BLEWITT (Basil). Fevers of the Typhus Group in the Bhim Tal Area, Kumaun Hills, U.P. India. Being a Report of an Investigation carried out into the Alleged Incidence and Nature of Typhus Group Fevers in the Bhim Tal Area Kumaun Hills, July 1938.—*Jl Roy Army Med Corps* 1938 Mar-Apr-May & June Vol. 70 Nos. 3 4 5 & 6 pp 157-167 241-245 312-315 379-387. With 1 map & 6 charts. [30 refs.]

The Kumaun Hills lie between the Terai foot-hills and the main range of the Himalayas at an altitude of 4 000 to 8 000 feet with numerous deep valleys and, in the locality under discussion a series of small lakes. Three of these lakes Bhim Tal Sat Tal and Naukuchhiya Tal lie in the Bhim Tal valley about nine miles from Naini Tal the Headquarters of the Eastern Command. This valley is about five miles in length by two in breadth and runs in a south-easterly direction through the hills. Along this valley runs one of the main trade routes from the plains to the hills and on to Tibet. There is much traffic along this road especially in the summer months. The majority of the local inhabitants are also nomadic and spend the summer in the hills and the winter in the plains.

Bhim Tal village is situated at the top of the lake on ground which is marshy in the rains but in the summer is covered with grass and scrub. During the hot weather the palace here has been occupied for the last 15 years by the Maharajah of Jind who brings with him annually about 500 people guests officials and servants and many dogs all these return to the plains in the cold weather. The Rajah and his household spend most of their time shooting in the valley and

surrounding hills but so far no cases of typhus have been reported among them. At Sat Tal the principal house and bungalows are in the possession of an American Mission and missionaries from the plains come up here in the hot weather for short periods of leave and to convalesce after illness. During the last six years no cases of typhus have occurred among the people.

So long ago as 1913 typhus was reported in the Bhim Tal area, Captain McKECHNIE I.M.S. [unpublished report] investigated the outbreak in that year and came to the conclusion that the cases, 32 in all were of true louse-borne typhus. Further sporadic cases have been reported from time to time in the same area. In 1916 Major (now Sir John) MEGAW [this *Bulletin* 1917 Vol. 9 p. 499] was camping in the Bhim Tal valley and contracted typhus fever and was of opinion that the vector in his case, was a tick. In 1926 one fatal case of typhus was reported. In 1932 four cases, two of which were fatal, and in 1936 two further cases. All these were Europeans visitors to the district and mostly officers on leave who had spent much of their time in the scrub and jungle around the lakes.

The author of the present paper who was stationed at Bareilly in the United Provinces, decided to investigate the question of typhus from the point of view of the vector. A field laboratory was established at Bhim Tal during the summer of 1936 a system of extended drives on a frontage of one-quarter of a mile was carried out from one end of the area to the other.

Three methods of collection were employed —

1 Removal and collection of ticks from all animals, cattle etc., met with during the course of the drive

2 Dragging the area with cloths and flags for collection of seed ticks

3 Removal of ticks from dogs and from coolies employed in carrying out the drives. Some thousands of ticks were collected in this way and about 1 000 were examined. 60 per cent. of these were *R. sanguineus* and *Hyalomma aegyptium*. These ticks were crushed in a mortar and emulsified and injected intraperitoneally into guinea pigs rabbits and white rats. Some of the ticks were also fed on rabbits and guinea pigs then crushed and injected into experimental animals. Twenty-six animals only were used owing to the difficulty of obtaining experimental animals no more were available. 614 ticks were fed and injected.

In one or two of the animals there was a slight febrile reaction but no definite typhus infection and in none of the rabbits or rats was there any positive Weil-Felix reaction. There is, therefore no indication from this work that infected ticks are numerous in and around Bhim Tal if they do exist.

The author is inclined to agree with McKECHNIE that the outbreak in 1913 was due to louse-borne infection and he also considers that the subsequent cases may be explained in the same way—susceptible people coming into close contact with natives carrying infected lice. He explains the occurrence of the disease in the Bhim Tal valley as being due to imported infection along the trade route which passes through the valley the camps and villages in the valley being the first stopping place on the road from the plains to the hills. His conclusions are that true louse-borne typhus is endemic in the Kumaun hills and that the geographical position of Bhim Tal on the main road to and from Almora and Tibet explains the occurrence of the disease.

in that valley and so far as his work went there was no evidence to support the theory that the cases which had occurred in and around Bhim Tal were due to the bites of infected ticks. *D Harvey*

FEDERATED MALAY STATES ANNUAL REPORT OF THE INSTITUTE
FOR MEDICAL RESEARCH FOR THE YEAR 1937 (KINGSBURY
(A Neave) Director) [Typhus-like Fevers. pp 106-120
LEWTHWAITE (R.)]

Wild rats were trapped in the town of Kuala Lumpur and from these two strains of the virus of endemic typhus (shop typhus) were obtained by inoculation into guinea-pigs which had been fed on a deficiency diet. Fever enlarged spleen and scrotal swelling without necrosis were noted in these animals. Rickettsia were seen in stained smears from the tunica vaginalis. This virus when injected into the eyes of rabbits caused a modified reaction which died out after the 3rd or 4th passage this is similar to the results obtained with the virus from cases of the disease and differs from the marked reaction which follows injection of the virus of tsutsugamushi fever (scrub typhus). The Weil Felix reaction was positive for *Proteus* $\Lambda 19$ up to a dilution of 1/1500. Rats were readily infected these developed high fever with high mortality. There was complete cross immunity between these two strains obtained from the rats and a virus previously isolated from a local case of endemic or urban typhus fever. Wild rats were caught in a plantation on which numerous cases of tsutsugamushi fever had occurred but only a few cases of endemic typhus. The brains of four of these rats were pooled and emulsified and this emulsion was inoculated into guinea-pigs and a strain of virus of endemic typhus was obtained. This strain when inoculated into the eye of rabbits gave the reaction of murine typhus yet the curious fact was noted that of 13 rabbits infected six gave a positive Weil Felix reaction with *Proteus* $\Lambda 19$ while two agglutinated *Proteus* $O\lambda K$ and nine were negative. This strain gave complete cross immunity with the strain isolated from the town rats and also with the human strain but the results with a virus of tsutsugamushi fever were indefinite. Cross infection in the eyes of rabbits with this strain and a strain of tsutsugamushi fever were obtained for instance one eye of a rabbit was inoculated with virus E endemic typhus a modified reaction followed and a positive Weil Felix reaction for *Proteus* $O\lambda K$ yet on inoculation of the virus of tsutsugamushi fever into the sound eye a maximum reaction followed. This virus ($\Lambda 19$) isolated from the plantation rats was utilized in transmission experiments with the rat flea and guinea-pigs from one of the guinea-pigs utilized a definite $O\lambda K$ or tsutsugamushi fever virus was obtained. An apparent mutation of the rat strain E took place from $\Lambda 19$ type of virus to λK type. This point is being further investigated. It is suggested that when the four original rats were pooled both viruses may have been isolated. Some 1 000 mites were taken from the captured rats and examined but no virus was isolated although some of these mites were actually taken from the four rats from which strain E was isolated.

Some Weigl lice vaccine was obtained from Europe and tested against the local strains of virus but no protection could be demonstrated. Some other vaccines were also tested by ageing of virus drying virus and coating with yolk of egg on oil and lanolin but without success. *D H*

RAYNAL (J.) Sur le typhus exanthématique de Changhaï (concession française). [On Typhus in Shanghai.]—*Bull. Soc. Path. Exot* 1938. July 6. Vol. 31 No 7 pp. 662-669

The author refers to a previous note on the same subject [see this Bulletin 1938 Vol. 35 p 781]. Since the publication of this note three new facts have emerged (1) an epidemic has been observed in the month of March 1938 (2) the virus has been isolated from two of the cases (3) a virus has also been isolated from rats caught in houses of patients.

In 1937 enormous numbers of refugees poured into Shanghai and the French concession was overcrowded. Cases began to appear in February and increased in March and April. Although these cases were severe the mortality was low 10 per cent., and the disease did not spread. The virus which was isolated from the cases produced fever and orchitis in guinea-pigs and was apparently identical with the virus isolated from the rats. The cases were therefore probably murine typhus.

D H

BLANC (Georges) & BALTAZARD (M.) with the collaboration of A. DOMNADIEU La contamination par voie muqueuse, mécanisme habituel de transmission du typhus murin dans la nature. Rôle du virus sec des déjections d ectoparasites dans l'épidémiologie des typhus. [Infection through the Mucous Membranes is the Usual Method of Transmission of Murine Typhus in Nature. The Role of the Dried Excreta of Ectoparasites in the Epidemiology of Typhus.]—*Bull. Acad. Méd.* 1938. July 28. 102nd Year 3rd Ser Vol. 120 No 27 pp. 109-114 With 2 charts. [22 refs.]

Forty mgm. of dried flea excreta, which had been kept for four months was dissolved in a small quantity of water and given to two men to drink. Twenty mgm. of dried excreta was placed on the nasal mucous membrane of two other men, and in two others 5 mgm. was placed on the conjunctivae. Of these six men, one who had been inoculated by the nasal route developed fever there was no reaction in the five others. However when these five were tested 65 days later by injection of living virus, three were found to be immune. It would appear therefore that at least four of the six men experimented on had been infected.

The authors have found that the dried excreta of infected lice or fleas may retain virulence for at least 12 months. In this way it is possible that infection may be carried over from one epidemic season to another without any actual cases occurring in the non-epidemic period. They suggest that louse-borne typhus infection may also be by the oral route with dried lice excreta.

During the course of their investigation they came across one mendicant from whose person and clothing they collected no fewer than 20,000 lice and "a mass" of dried excreta.

D H

STARZYK (Jean) Vitalité, virulence et pouvoir immunisant de *Rickettsia prowazeki* conservés en dehors de l'organisme du pou. [The Vitality Virulence and Immunizing Power of *Rickettsia prowazeki* maintained outside the Organism of the Louse.]—*Arch. Inst. Pasteur de Tunis* 1938. Sept. Vol. 27 No. 3. pp. 263-281 With 12 figs.

In the first series of experiments emulsions of the intestines of infected lice were made in the following liquid media, human serum

guineapig serum horse serum and in normal saline solution These were kept at laboratory temperature and tested by inoculation into lice by the intestinal route. It was found that the best medium for the preservation of the virus was human serum lice could be infected up to six days the percentage of red lice that is lice with maximum infection was also greater in those injected with the emulsion in human serum

In the second series of experiments dried material was utilized

1 Intestines of infected lice removed and dried in vacuo

2 Lice excreta dried similarly

3 Whole infected lice dried and kept at laboratory temperature or at +5 C

At laboratory temperature the virus was still infective after 30 days in the whole lice after 58 days in the excreta and after 60 days in the intestines

When the dried materials were kept at +5°C the following results were obtained

Dried excreta, still infective 4½ months

Dried intestines still infective 6 months

Dried lice still infective 3 months.

[These figures are taken from an *erratum* published subsequently]

All these were proved by injection into normal lice and the subsequent emulsifying of these lice and injection into guineapigs which became infected

The author points out that this is a simple way of maintaining the virus in the laboratory and also of sending the virus to other places From the epidemiological standpoint it is of vital importance as it shows that infection may be carried not only by living but by dead lice or the dried excreta of lice and also explains how infection may be carried by or on the clothes of infected persons even after many months

[It is interesting to note that recently attention has been called to the risk of infection from dried excreta of lice in the paper by BLANC above and the present paper The British Trench Fever Commission under the Chairmanship of Sir David BRUCE and of which Professors BACOT and ARKWRIGHT were members insisted more than 20 years ago on the importance of this method of infection.]

D H

LE CHUITON (F) & PENNANÉACH (J) Essais de transmission du typhus murin au cobaye par la voie respiratoire. [Attempts to transmit Murine Typhus to the Guinea-pig by the Respiratory Route.]—*Bull Soc Path Exot* 1938. July 6. Vol. 31 No 7 pp 559-561

The strain of virus used was that of Toulon murine typhus (ship typhus) An emulsion of the brain of infected guineapigs was injected directly into the lungs of two normal animals. Both developed fever and were immune when tested later The same inoculum was injected directly into the trachea no fever resulted but the animals were found to be immune later It is possible that in making these injections small wounds may have been made and the infection resulted from absorption of virus through these lesions Accordingly guineapigs were

placed in a glass vessel and sprayed with the infective emulsion but no infection resulted nor was immunity produced.

The conclusion reached is that the respiratory route of infection can be only exceptional. [Possibly if dried excreta of infected fleas had been used the results would have been different.] D H

PHILIP (Cornelius B.) & PARKER (R. R.) The Persistence of the Viruses of Endemic (Murine) Typhus, Rocky Mountain Spotted Fever and Boutonneuse Fever in Tissues of Experimental Animals. —*Public Health Rep* 1938. July 22. Vol 53 No 29 pp 1246-1251

Rats, ground squirrels and mice were used in this research.

From rats infected with the endemic typhus virus the virus could be isolated from the brain up to 370 days and from the spleen up to 153 days. In 30 days the infection had disappeared from the tunica.

In mice the virus could still be recovered after 150 days from the brain and 130 days from the spleen. In squirrels the virus could not be recovered after 30 days from brain or spleen. With the virus of Rocky Mountain fever and boutonneuse fever neither mice rats nor guinea pigs showed any infection after 30 days. D H

- i. BORSEAU (R.) Technique simple et économique de conservation et d'entretien du virus de la fièvre boutonneuse. [A Simple Technique for the Maintenance of the Virus of Boutonneuse Fever.] —*Bull Soc Path Exot* 1938 Nov 9 Vol 31 No 9 pp 791-794
- ii. ——— Transport à distance du virus de la fièvre boutonneuse conservé *in vitro* [Transport to a Distance of the Virus of Boutonneuse Fever in Vitro.] —*Ibid* pp 794-796

i The entire testicle with the adherent tunica is removed from an infected guinea pig and immediately placed in a test tube containing a solution of two parts glycerine and one part normal saline. In this solution the virus remains active for 1 day at room temperature and if kept at 0°C for 11 days and at -10°C. for at least 40 days.

ii The test tube containing the testicle can be placed in a metal case cooled to -10°C then the case can be packed in ice in a flask and sent to a distance by air and then utilized for injection of animals, etc. This has been successfully accomplished by the author.

D H

HITZ (Siegfried) Cultivo de la *Rickettsia prowazeki* in vitro [Cultivation of *Rickettsia prowazeki* in vitro] —*An. Escuela Nac Ciencias Biol Mexico* 1938. Oct.-Nov.-Dec. Vol. 1 No 1 pp 7-28. With 5 figs on 4 plates. [45 refs.] English summary.

The present report describes, after some short considerations about the relations among the different typhus fever strains, followed by a short historical introduction, a method to cultivate *Rickettsia prowazeki* in vitro based on the classical one of Mastrand and Mastrand, adopted to the culture of *Rickettsia* by Nigg and Landsteiner. We have introduced some modifications to this method, as the substitution of Erlennmeyer flasks by test tubes and Tyrode's solution by human ascites. With this method we obtained satisfactory results, comparable to those obtained with the original method. The strain was cultivated throughout more than 20

generations having observed a growth curve similar to that of bacteria in the series of cultures in which the number of rickettsiae was determined daily. The virulence of the cultures was proved by inoculation into guinea pigs which developed the symptomatology of typhus fever immunity to reinoculation and showed rickettsiae in the tunica vaginalis. The morphological study of the cultures colored by methods extensively described shows the form of propagation of the germs their exclusively intracellular position and a possible invasion of elements of the connective tissue of the muscles.

Judging premature the attempt to cultivate the *Rickettsia prowazeki* in cell free media the author expresses the hope that a detailed study of the factors prevailing in Martland cultures will solve the question. The germ of typhus fever should be considered more closely related to the bacteria than to the filtrable virus, especially to those of the haemophilus group which need for their growth certain substances produced by cells.

VIOLLE (H.) *Expérimentation sur le typhus exanthématique murin* [Experiments with the Virus of Murine Typhus.]—*Marseille Méd* 1938 July 5-15 Vol 75 No 19-20 pp 29-36

Three types of fever of the typhus group are met with in the south of France —

1 A few imported cases of true louse-borne typhus these do not spread

2 Murine typhus on board ships in Toulon harbour

3 Boutonnoise fever

The author obtained blood from cases of fever on a ship in Toulon harbour and inoculated this into rats and guinea pigs a virus was isolated and passaged it was found that in white rats the virulence of the virus was much enhanced by passage and especially in rats fed on a deficient diet. Guinea pigs had only a mild febrile reaction with periorchitis. In rabbits and puppies there was no fever but the virus could be recovered from these animals up to five months in the rabbits and three months in young dogs.

Pigs also could be infected and showed a very definite rash in these animals also the infection was inapparent but the virus could be recovered up to three months. All these animals could be infected readily by feeding them on infected material such as brain of guinea pigs or urine of white rats.

Blood taken from patients during the fever and allowed to clot then mixed with bread and fed to rats infected these animals.

Rats and guinea pigs could also be readily infected by intradermal injection of small quantities of infective material in a fine needle. The virus was readily destroyed by carbolic acid and other diluted disinfectants.

D H

WOHLRAB (R.) *Die experimentelle Infektion weisser Mäuse mit murinem Fleckfiebevirus* [Experimental Infection of White Mice with the Virus of Murine Typhus.]—*Zent f Bakt* I Abt Orig 1937 Vol. 140 No 3/8. Beiheft pp 193*-201* With 9 figs.

Some 1 000 animals were used and they were found to be readily infected by the peritoneal route. Brain emulsion was used as the infective material in doses of 0.25 cmm. in 1/50 000 dilution. Of 100 animals which received doses in 1/8,000 dilution 63 died 10 were severely ill, 18 were ill and 7 showed no reaction. The clinical and

post-mortem results are detailed and excellent photographs are reproduced showing *Rickettsia* in enormous numbers in the peritoneal fluid. The strains of murine typhus used were Mexican and Tunis No 1.

D H

LAIGRET (J) & AUBURTN (P) Coloration rapide des rickettsias par la thionine (Rapid Staining of Rickettsia with Thionine).—*Bull Soc Path Exot* 1938. Nov 9 Vol. 31 No. 9 pp 790-791

The thionine is prepared as follows. Dissolve the powder to saturation in distilled water precipitate with 10 per cent. solution of caustic soda filter and wash in water dissolve in 2 per cent. carbolic.

The secret of the process is that the stain should not be allowed to act for more than 30 to 50 seconds, then differentiate with absolute alcohol for 2 seconds. The stain should be kept for some time before use the authors prefer this method of staining to Giemsa. D H

LIT (P Y) ZIA (Samuel H.) & WANG (K C) Serological Studies on Subjects vaccinated against Typhus Fever.—*Proc Soc Experim. Biol. & Med* 1938 June Vol 38 No. 5 pp. 682-684

Doctors and nurses exposed to typhus infection in Peking Medical College Hospital were inoculated with loose vaccine. Material from 100 infected bee was inoculated in each person in three doses at weekly intervals. The reactions of the sera of these persons were studied, the sera were tested against emulsions of *Rickettsia* and also *Proteus* X19 emulsion.

The results of the tests are given in tabular form of 121 sera tested 37 gave negative reactions with *Rickettsia* emulsions, 16 gave negative reactions with *Proteus*. The majority of the sera were tested in the first three months after inoculation. D H

PIJPER (Adrianus) & CROCKER (C G) Rickettsioses of South Africa.—*South African Med. J* 1938 Sept 10 Vol 12. No. 17 pp 613-630 With 17 figs. [105 refs.]

A résumé of the work done by the authors on the local or South African types of typhus fevers with suggestions for further intensive research.

As has already been shown there exist in South Africa at least three types of typhus fever namely tick bite fever epidemic typhus presumably louse-borne and sporadic or murine typhus. These three diseases are more closely allied to one another than to the similar diseases of other countries. Tick bite fever resembles boutonneuse fever clinically primary sore rash etc. but cross immunity experiments between these two viruses were negative. The epidemic typhus of South Africa resembles the same disease in other countries but differs in that mortality is less and also the sera of cases agglutinate as a rule *Proteus* O\19 only in low dilutions and in addition agglutinate *Proteus* O\2 and O\K. A series of rabbits were inoculated with the virus of South African typhus and the serum of these animals agglutinates *Proteus* OY12 OX2 and OYA whereas when rabbits are inoculated with the virus of European epidemic typhus virus agglutinins are produced for *Proteus* O\12 but not for O\2 or O\K.

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The sporadic typhus of South Africa is as elsewhere a disease of rats but this disease also produces agglutinins for *Proteus* O\19 O\2 and OXA in the sera of patients

The virus of epidemic typhus of South Africa as the author has already shown immunizes against sporadic typhus and tick bite fever. The virus of sporadic typhus (S.A.) immunizes against tick bite fever but not against epidemic typhus. Tick bite fever does not immunize against either of the other two viruses. D H

MATHEW (R V) *Endemic Typhus in North Queensland.*—*Med J Australia*, 1938 Sept 3 25th Year Vol. 2, No 10 pp 371-377 With 2 maps 4 figs & 3 charts

There are two types of typhus group fevers in North Queensland in one the sera agglutinate *Proteus* X19 and correspond to urban or shop typhus rat typhus in the other the sera agglutinate *Proteus* OAK in some of these cases there is a definite primary sore but in others no such lesion can be found and these latter resemble scrub typhus of Malaya.

During two years 1935-1937 some 300 cases of fever were investigated by the author in North Queensland. Of these 77 were definitely diagnosed as belonging to the typhus group. All of the six cases in the X19 class lived and worked in the towns whereas the cases in the XA class occurred in field workers especially among those who were engaged in clearing scrub or working in fields recently cleared.

Bites of mites and ticks are of frequent occurrence amongst those moving about on the scrub lands. In 17 of the XA cases a cutaneous inoculation lesion was present resembling the characteristic lesion at the site of the mite bite of Japanese River fever yet in one of these cases a tick had been removed from the skin at the site of the lesion some days previously. No lesion was noted in 30 XA cases and in 24 enlarged and painful lymphatic glands were noted. A rash was observed in all of the 6 X19 cases. Of the XA cases rash was observed in 35 and was not observed in 8. Of the XA cases 23 were mild 22 moderately severe 10 severe and 5 of grave severity. There were four fatal cases.

Animals were inoculated with blood from the cases and also with emulsion of brain from a fatal case. One hundred and four rodents rats and bandicoots were examined for the Weil Felix reaction and attempts were made to isolate a virus from the animals which gave a positive reaction but without result. D H

NAUDI (J) *Two Cases of Tropical Typhus.*—*West African Med J* 1938 Oct. Vol. 10 No 1 pp 34-35 With 2 charts

DAVEY (T H) *Serological Report.*—*West African Med J* 1938, Oct Vol. 10 No 1 p 40

DERRICK (E H.) *The Diagnosis of Fevers in South Queensland.*—*Med J Australia* 1938 Oct. 29 25th Year Vol. 2, No 18, pp 723-729 With 6 figs.

SLATINEANU (AL) & POTOP (L.) *Sur les variations de la pro démie et des polypeptides sériques et rachidiens dans le typhus exanthématique — [On the Variation of the Protein Content and of the Polypeptides in the Serum and Spinal Fluid in Typhus.]*—*C R Soc Biol* 1938 Vol. 129 No 30 pp 716-718

L. BOTZARIS (A.) La formule leucocytaire des cobayes inoculés de typhus exanthématique endémique. (Counts of White Blood Cells in Guinea-pigs inoculated with the Virus of Endemic Typhus).—*Folia Haematologica*, 1938. Vol. 60. No. 4 pp. 363-374. With 13 figs. [24 refs.]

ii. — Quelques examens hématocytologiques sur 4 cas de typhus exanthématique endémique. (Some Haematological Examinations on 4 Cases of Endemic Typhus).—*Ibid.* pp. 375-380

i. The acidophile cells (polymorphs) show a slight increase after the inoculation due probably to the injection of foreign protein the numbers of these cells then fall to normal but there is a second rise just before and during the fever. Eosinophile cells remain at normal or may be slightly reduced. In animals in which there was a high eosinophile count before inoculation there was a marked fall in the numbers during the fever.

Large mononuclear cells may be five times as numerous during the fever. Lymphocytes are decreased when the polymorphonuclear cells are increased, but there is a late (up to 48 days) increase in convalescence.

ii. Three phases in the cases were considered (1) The period of the fever up to the defervescence (2) the period of falling temperature (3) convalescence.

Resumé.—Increase of red cells was noted in only one case, 1 million per cmm. There was a return to normal 4 days after apyrexia. Leucopenia was noted during the febrile period and was more marked during defervescence but leucocytosis was observed during convalescence. Polymorphs were normal or slightly diminished during the fever and this diminution of numbers is also noted in convalescence. Eosinophiles disappear during the fever returning to normal in convalescence. Lymphocytes are generally augmented during the fever and a marked and prolonged lymphocytosis during convalescence was the chief item in the blood picture. D H

PETETAKIS (M.) Le typhus endémique bénin d'origine murine en Grèce (Benign Endemic Murine Typhus in Greece).—*Bull. Soc. Path. Exot.* 1938. Nov. 9. Vol. 31. No. 9 pp. 848-855.

The author has repeated the work of Professor LEROUX and confirmed it. He himself has recently observed 12 cases of the disease in and around Athens. A clinical description is given. A murine typhus virus was isolated from the patients and also from rats caught in the same districts. The differential diagnosis is discussed. 'boutonneuse fever' can be distinguished by the characteristic rash and by the presence of the primary sore. Also endemic typhus occurs in association with rats, 'boutonneuse fever' in association with dogs and dog ticks. D H

RISQUEZ (Jesús Rafael) FIGARELLA (Jorge) & VAN PRAAG (Antonio) Primer comunicación clínica sobre tifo exantemático en Venezuela. (Exanthematic Typhus in Venezuela).—*Rev. Med. de Caracas*, 1938. July 31 & Aug. 15. Vol. 45. Nos. 14 & 15. pp. 210-214, 225-234.

The authors give notes of eleven cases of fever with a roseolar exanthem in which they were able to exclude as causes malaria, enteric

(typhoid and paratyphoid) and undulant fever. Two of them gave a positive Weil Felix reaction with serum diluted to 1 in 800. Three others are mentioned in a postscriptum footnote whose sera also gave the reaction in the same dilution. More exact bacteriological reactions to the different types of *Proteus* have not yet been worked out.

H H S

GOHAR (M A) Protective Inoculation against Typhus.—*Jl Trop Med & Hyg* 1938 Aug 15 Vol 41 No 16 p 261

A method of immunization against typhus by using the carbolized emulsion of the brain of typhus infected guineapigs is described.

D H

SCHWEICKHARDT (Erwin) Die Verbreitung des Fleckfiebers in Mexiko und der gegenwärtige Stand seiner Bekämpfung und Behandlung mit Schutzimpfstoff und Heilserum. [The Distribution of Typhus Fever in Mexico and the Present Position in Regard to Prevention and Treatment by Vaccines and Sera.]—*Arch f Schiffs u Trop Hyg* 1938 Aug Vol. 42. No 8 pp 350-366 With 12 figs. [26 refs.]

In Mexico there are numerous cases of typhus with many deaths in the Central States and only a few mild cases in North Western districts adjoining the United States these latter are probably cases of murine typhus. There is no typhus at all in the North East or in the tropical South West coastal districts. 1700 deaths from typhus were reported in 1936. Blood taken from cases during the fever and injected into guineapigs produced fever with orchitis in these animals it was noted that there was a strong affinity of the virus for the endothelial cells of the serous membranes. This is taken advantage of in the method of ZINSSER [this *Bulletin* 1937 Vol. 34 p 485-486] in the preparation of vaccines from the numerous *Rickettsia* found in infected and irradiated rats. The *Rickettsia* thus obtained are killed by formalin and the vaccines prepared in this way have produced protection against the Mexican type of typhus although they do not protect against the European virus to the same extent. Horses have been immunized with massive doses of this vaccine and the sera of these animals have been employed in the treatment of cases of typhus fever and in the experimental protection of guineapigs. Twenty patients were treated and marked improvement was noted in 13 of these there were only three deaths in treated cases whereas the usual mortality rate in untreated cases has been 40 per cent. D H

BLANC (Georges) & BALIAZARD (Marcel) Vaccination contre le typhus exanthématique par virus sec de typhus murin provenant de puces infectées [Vaccination against Exanthematic Typhus by Dried Murine Typhus Virus obtained from Infected Fleas.]—*C R. Acad Sci* 1938 Sept. 26 Vol. 207 No. 13 pp. 547-548.

The faeces of fleas (*X. cheopis*) which had been fed on infected white rats were collected and dried *in vacuo*. When required for injection

the dried faeces were suspended in a special saline solution and bile in a dilution of 1/150 is added.

Over 1 000 persons have been vaccinated with this bile treated vaccine. The immunity of these persons has been tested by injections of doses of living virus. Only three gave any febrile reaction. The dried faeces can be preserved for long periods, up to one year and the virus remains alive and potent. The material can be readily sent to a distance and vaccines prepared on the spot. D H

JORDAN (J H) & FLETCHER (A. E.) A Note on Disinfection with Particular Reference to Typhus.—*Chinese Med J.* 1938 July Vol. 54 No. 1 pp 71-72.

Tests were made on lice infested clothes with a local liquid disinfectant containing cresylic acid and phenols but without success however it was found that if 4 per cent. of ammonia was added to the disinfectant lice and eggs were all destroyed in one hour. Walls and furniture were washed with the solution and clothes were soaked in it. D H

ZIA (Samuel H) & LIU (P Y) Dissociation of *Rickettsia* and *Proteus* X 19 Antibodies in Experimental Typhus Infections.—*Proc Soc Experim. Biol & Med* 1938 June. Vol. 33. No. 5 pp 685-687 With 1 text fig

In this research a small rodent (*Myosorex fontanieri*) was employed it was found that these animals were readily infected with typhus virus and when infected the serum gave a strong positive Weil-Felix reaction. The animals were infected by the injection of guinea pig brain and were tested over long periods, blood being drawn off from time to time.

Rickettsia emulsions and emulsions of *Proteus* X19 were employed. It was found that the agglutinins for *Rickettsia* appear early and disappear quickly. The Weil-Felix reaction appeared later and lasted longer also the results were not parallel in the same animal one would give a high titre for *Rickettsia* and low Weil-Felix, another a low titre for *Rickettsia* and a high Weil Felix reaction these results agree with those obtained in vaccinated persons by the same observers. D H

PIÉRI (Jean) Histoire de la fièvre boutonnaire [A History of Boutonnaire Fever].—*Marseille-Méd.* 1938. July 5-15 Vol. 75. No. 19-20 pp 17-28. With 5 figs.

A review of our knowledge of the fever from the year 1910 when it was first described by COXON and BRUCH in Tunis, up to the present time.

In 1920 the disease was first noted in Italy and in 1925 in France. In this year the author himself first described the primary sore or *lèche noire*. The various papers referred to have all been summarized from time to time in this *Bulletin*. D H

OLMER (D.) & OLMER (Jean) *Virus boutonneux et fièvres exanthématiques. [The Viruses of Boutonneuse Fever and of the Typhus Fevers.]—Marseille Mfd 1938. July 5-15 Vol. 75 No 19-20 pp 9-16*

A review of the work done by the authors and others on boutonneuse fever and also on other members of the typhus group such as true typhus murine typhus Rocky Mountain fever etc

The authors sum up by saying that the virus of boutonneuse fever is now well characterized it is sharply differentiated from the viruses of the typhus group true typhus and endemic typhus it can also be differentiated although not so certainly from the virus of Japanese River fever it is most closely allied to the virus of Rocky Mountain fever Nevertheless it is considered that the characteristics of the virus are fixed and confer on it an indisputable individuality

D H

BOISSEAU (R.) *Sur un cas de fièvre boutonneuse expérimentale observé chez l'homme. [On a Case of Experimental Boutonneuse Fever observed in Man.]—Bull Soc Path Exot 1938 Oct 12. Vol. 31 No 8 pp 743-752. With 2 figs. [21 refs.]*

On 1st June 1938 the author inoculated into the skin at the back of his left forearm a minute dose of boutonneuse virus This virus had originally been isolated from dog ticks and had then been passaged for over 40 generations in guineapigs it could thus be regarded as a fixed and pure virus. The inoculation was made with a fine needle directly under the epidermis. In 36 hours there was some redness and slight thickening could be felt at the site of inoculation in 48 hours the lesion had increased in size and a small papule appeared



Local lesion 12 days after the inoculation into the skin of a minute dose of boutonneuse virus. [Photographed by Dr LORANDO]

[Reproduced from the *Bulletin de la Société de Pathologie Exotique*]

In the centre no pain was felt and there was no fever. On the 4th day the centre of the primary sore became definitely black. On the 5th day the sore had increased in size but no swollen or inflamed glands could be detected. On the 6th day the primary sore had reached its zenith and measured about 3 cm. in diameter and the black centre about 1 cm (see Fig). It was extremely tender but the surrounding skin was perfectly normal and not sensitive. On the 7th day from inoculation the sore began to recede and at the same time the invasion of the general system commenced. The temperature rose to 39°C. and a rash was noted on the arms and legs. Muscle pains were noted on the following day the lumbago and pains in the legs were acute. On the 12th day headache began and lasted for 3 or 4 days. macromela also was persistent throughout the illness. Neuralgia and carache were specially troublesome also pains in the joints. The writer sums up his experience as follows "a malady without real gravity but affecting all the organs of the body." The Weil-Felix reaction was positive for *Proteus* OX19 in 1/200 dilution. D H

GIBBONS (R. J.) *Sylvatic Plague and Rocky Mountain Spotted Fever Surveys, in Western Canada, during 1938.*—*Bull. Brit. Columbia Board of Health.* 1939 Mar Vol. 9 No. 3. pp. 30-33.

In most such surveys the outcome to be expected is the finding among rodents of a widespread infection or an epizootic. This however was not the case on the present occasion, where a cooperative effort was made to cover the provinces of Alberta and British Columbia, including the seaports of Vancouver and New Westminster. The staff was vaccinated as a preliminary with Rocky Mountain spotted fever vaccine.

In summary it was found that — 1 (a) Rocky Mountain spotted fever has been endemic in Western Canada since at least 1917. (b) No evidence of infection with the Rickettsia of Rocky Mountain spotted fever was found in 30,000 ticks collected, although *Basil. tularensis* infection was found. 2 No evidence of *P. pestis* infection was encountered in 3,569 wild rodents and 7,582 rodent fleas of Alberta and British Columbia nor in the 1,277 rats and 1,178 rat fleas of Vancouver and New Westminster. W F Harvey

PILCHER (Lewis S.) *Rocky Mountain Spotted Fever in Massachusetts. Report of a Case.*—*New England JI of Med.* 1938, Sept. 15 Vol. 219 No. 11 pp. 378-382.

A case of Rocky Mountain fever eastern type, which occurred in Massachusetts in July 1937 is reported. Two other cases which received their infection in Massachusetts during July 1937 but were treated in Rhode Island, have also been recently reported. These cases are apparently the first instances of this disease to be diagnosed in the New England area. D H

FLIPPIN (Harrison F.) *Typhus Fever in Pennsylvania.*—*Amer. JI Med Sci.* 1938 Aug. Vol. 196 No. 2 pp. 248-252. With 2 figs. [19 refs.]

An historical account of the incidence of typhus in Pennsylvania. The last reported outbreak of epidemic typhus was in 1883. endemic

typhus was first reported in 1911 and 27 cases have been recorded up to date. It is suspected that some of these were Rocky Mountain fever
D H

JORDAN (Carl F.) *Rocky Mountain Spotted Fever and Tick Survey in Iowa.*—*Amer Jl Public Health* 1938. Dec. Vol. 28 No 12. pp 1411-1414

During the five-year period 1933-37 2 190 cases of Rocky Mountain spotted fever were reported in the United States as a whole distributed as follows —

	Per cent
The Mountain and Pacific States	65.5
South Atlantic States	27.4
North and South Central States	5.4
New England and Middle Atlantic States	1.7

The first case of spotted fever in Iowa State was reported in 1933 and to date 38 cases have been officially notified. A clinical description of the cases follows: the mortality rate was 24 per cent although the majority of the cases were mild. Nearly half the patients were children and 32 out of the 38 cases occurred on farms or in rural areas and most were associated with dogs heavily infested with ticks (*D. variabilis*).

A tick survey was undertaken and numerous ticks were collected and sent to Montana for examination: practically all were *D. variabilis* the animal hosts of these ticks besides the dog were cows, sheep, horses, goats and also squirrels, rabbits and wood chucks. Ticks collected from the Indian Reserve where cases had occurred and also from a farm where three children had had spotted fever (one died) were proved to harbour the virus of Rocky Mountain spotted fever
D H

BISHOPP (F. C.) & SMITH (C. N.) *The American Dog Tick, Eastern Carrier of Rocky Mountain Spotted Fever.*—*Circ. U.S. Dep. Agric.* Washington D.C. 1938. Apr. No 478. 25 pp. With 13 figs. [15 refs.] [Summarized in *Rev. Applied Entom.* Ser. B. 1938. Dec. Vol. 26. Pt. 12. pp 249-251.]

A detailed account is given of the bionomics of *Dermacentor variabilis* Say which is the principal if not the only vector of Rocky Mountain spotted fever in the central and eastern portions of the United States where an average of 140 cases occurs annually with a death rate of 25 per cent. It is also a vector of tularemia in man and animals and of anaplasmosis (*Anaplasma marginale*) in cattle. It is a serious pest of dogs causing severe irritation and loss of condition and often infests horses.

It is widely distributed throughout the United States east of the Rocky Mountains, in western and northern California, and in parts of Oregon: it is most abundant along the eastern coast from Massachusetts to Florida. It seems likely that low relative humidity is the most important factor limiting its distribution and abundance in the eastern states. It is most numerous in areas covered with grass or underbrush and occurs less frequently in forests where the species of mice that serve as hosts of the immature stages are less numerous. The dog is the chief host of the adults though others of the larger mammals may also be infested. Rabbits appear to be of little importance and birds are not attacked.

Unengorged adults live for long periods: one female kept under observation lived at least 968 days and possibly as much as 1 053. Adults, as well as other stages, require considerable moisture and if kept under

dry conditions live for much shorter periods. The longevity of adults that have attached to hosts is comparatively short. Most of the male and slightly engorged females that are removed from a host die within a few weeks, though occasionally one may live for 5-6 months. This is of some importance, since the organism causing Rocky Mountain spotted fever is activated in the tick by feeding and such partly engorged ticks may transmit the disease during a very short period of attachment. Engorgement of females, which is retarded by the absence of male, normally requires 8-13 days. Pairing takes place on the host 4-6 days after attachment, but is always preceded by a feeding period in both sexes. The preoviposition and oviposition periods varied with the temperature from 3 to 24 days and 14 to 32 days respectively. Eggs are laid in large masses in protected places on the ground—a female usually lays between 4,000 and 6,500 and dies 3-36 days after the completion of oviposition. The larvae remain in masses on the soil or on low growing vegetation and if conditions are sufficiently moist, survive for long periods. In the laboratory the maximum period was between 345 and 377 days. The average period for engorgement was 4-14 days. During the winter the period during which the larvae dropped from the host was distinctly prolonged though the period of engorgement was almost identical whether the hosts were kept in a warm or a cool room. The engorged larvae seek shelter on the soil surface. The period from dropping to moulting is markedly influenced by temperature—it varied from 8 days at about 84 F to 87 days at about 55°. The maximum longevity of unfed nymphs kept on moist sand was between 274 and 309 days, but most of them did not live more than 6 months. The period required for engorgement averaged 5-2 days. The period from dropping to moulting ranged from 17 to 105-109 days, being greatly prolonged during cold weather.

The seasonal incidence of the adult ticks is discussed; it varies in different parts of the United States, but, in general, the adults are most abundant in spring and early summer and their numbers diminish sharply in the hot dry months in late summer. In the south, they have been taken in every month of the year and breeding continues, though at a slower rate throughout the winter. In the colder parts of the country overwintering may take place in all stages but the egg. As few females become engorged and lay eggs in late summer most eggs hatch before the onset of winter. Unfed adults found completely quiescent in clumps of bunch grass became active in a short time when warmed. Larvae and nymphs occur on mice and other small mammals throughout the winter—their numbers increase after periods of mild weather and decrease almost to nil after severe weather. It appears that ticks that engorge during the winter all moult during a comparatively short time in spring.

Climatic factors are probably the chief ones exercising natural control of this tick, and of these excessive dryness is the most important. *D. variabilis* is very resistant to cold. Predators such as poultry, wild birds and mice doubtless destroy many ticks, especially engorged females. The need for further work on the parasite *Hemertellus hoodi* How is emphasized. In areas where there is an abundance of both small and large animals, the complete control of ticks by artificial means would appear to be almost impossible but in certain areas large wild animals suitable as hosts for the adults are few or absent, and under such conditions the treatment of dogs would probably result in satisfactory control, particularly if measures were also taken to reduce the numbers of meadow mice (*Microtus pennsylvanicus*) the principal hosts of the immature stages. An effective dip or wash for dogs can be made by dissolving 1 oz. soap in 1 U.S. gal. water and adding 2-4 oz. derris powder with a rotenone content of 4 per cent. This treatment, which should be applied at intervals of 5-6 days, will greatly reduce the number of ticks that become attached and prevent engorgement and reproduction. Derris powder is easier to apply but is not so effective and should be used at shorter intervals (2-3 days). Other measures recommended include clearing undergrowth and

keeping grass closely cut, especially near habitations etc., and the use of clothing designed to prevent infestation when it is necessary to traverse infested areas.

BRIGHAM (George D) *Endemic Typhus Virus in Mice*—*Public Health Rep* 1938 July 22. Vol 53 No 29 pp 1251-1256 [14 refs]

Endemic typhus virus can be maintained in native field mice which are numerous in the typhus area of Alabama. In the cotton mouse the virus was transferred through 16 generations before it was lost. In old field mice the virus has been carried through 36 passage generations. The virus has been found to survive 141 days in the cotton mouse 141 days in the old field mouse and 78 days in the golden mouse D H

BRIGHAM (George D) *Susceptibility of Animals to Endemic Typhus Virus. (Second Report.)*—*Public Health Rep* 1938 Nov 25 Vol. 53 No 47 pp 2078-2079

In a previous report from the same laboratory at Alabama it was reported that several species of field mice and rats were susceptible to endemic typhus virus also a typhus virus had been isolated from an old field mouse captured in the district. In addition it is now reported that the grey squirrel fox squirrel cotton tail rabbit swamp rabbit chipmunk and skunk are all susceptible to inoculation with the virus. But racoons and the grey fox are not susceptible D H

DAVIS (Gordon E) & PARKER (R. R.) *A Comparative Study of Two Strains of Rocky Mountain Spotted Fever Virus with Special Reference to the Well-Felix Reaction.*—*Public Health Rep* 1938 Aug 26 Vol 53 No 34 pp 1525-1531 With 6 charts

It was found that there were five types of serological reaction with various strains of *Proteus* in patients suffering from Rocky Mountain fever. Thus

- | | |
|---|---|
| (1) $\lambda 19$ high titre | $\lambda 2$ low titre |
| (2) $\lambda 19$ low | $\lambda 2$ high |
| (3) $\lambda 19$ positive | $\lambda 2$ negative |
| (4) $\lambda 19$ negative | $\lambda 2$ positive |
| (5) $\lambda 19$ titre equal to $\lambda 2$ | $\lambda 2$ titre equal to $\lambda 19$ |

Two strains of virus were isolated from patients of types (2) and (3) and comparative studies made of these two strains. Cross immunity tests were carried out but no immunological difference could be made out. Rabbits were inoculated with the two strains but no difference in immunological or serological response could be detected. Strain 3 which produced only agglutinins for *Proteus* O $\lambda 19$ in man produced agglutinins for both strains in rabbits. Protection tests were carried out and it was found that immune sera of either strain neutralized the other D H

DIAS (Emmanuel) *O cão como provável reservatório do vírus da febre maculosa brasileira. [The Dog as a Likely Reservoir of the Spotted Fever of Brazil.]*—*Brasil Medico* 1937 Dec 18 Vol 51 No 51 pp 1245-1247 [12 refs]

The denomination of *Brazilian spotted fever* is now used for the São Paulo type of endemic typhus or the exanthematic typhus of

Minas Geraes. Ticks of the *Amblyomma* genus namely *A. striatum* and *A. cajennense* are known vectors and they are found in dogs. Moreover the serum of such dogs gives a positive Weil-Felix reaction with varieties of *Proteus* namely to 1 in 640 with *Proteus* HAK up to 1 in 320 with *Proteus* OY19 OY2 and HX1 to 1 in 160 with *Proteus* HX19 HXK and OXL and to 1 in 80 with *Proteus* HX2 and HXL. This fact brings the Brazilian type of fever more closely into line with Rocky Mountain spotted fever carried by the dog-tick *Dermacentor variabilis* and boutonneuse fever by *Rhipicephalus sanguineus* found on dogs on the Mediterranean littoral. H H S

TRAVASSOS (J) Le chien réservoir de virus possible du "typhus exanthématique de São Paulo" [The Dog as a Possible Reservoir of the Virus of São Paulo Typhus].—*C R Soc Biol* 1938, Vol. 129 No 24 pp. 74-76.

The author has already shown that ticks of the species *Amblyomma striatum* taken from dogs captured in the quarter of São Paulo where the fever occurred were infective for guinea-pigs. Four dogs were caught and killed in one case a Weil-Felix reaction for *Proteus* X19 in a dilution of 1/160 was obtained, the blood and organs were injected into guinea-pigs in two of these slight fever was noted and these two animals when tested later were immune. Dogs can be infected by injection of virus and the Weil-Felix reaction becomes positive and the blood of the dogs was shown to be infective by the 11th day after inoculation. D H

DE MAGALHÃES (Octavio) Typho exanthematico em Minas Geraes. (IIa comunicação.) [Typhus Fever in Minas Geraes].—*Brasil Medico* 1938, July 9 Vol. 52 No 28, pp 634-638. With 1 fig

The author has previously reported that typhus in Minas Geraes may be transmitted by ticks and occasionally by the bug *C. lectularius*. In the present communication he records more details of animal experiments with *Amblyomma cajennense* as the vector. He finds that the tick having fed on an infected animal becomes infected and after an interval of 30 hours remains infective for life. When allowed then to feed on a guinea-pig the latter contracts the disease with an average incubation period of 5-4 days. H H S

DE MAGALHÃES (Octavio) Typho exanthematico em Minas Geraes. Anatomia pathologica. [The Morbid Anatomy and Histology of Typhus exanthematicus in Minas Geraes].—*Brasil-Medico* 1939, Jan Vol 53 No 5 pp 104-113 With 14 figs

This article cannot be abstracted those interested must consult the original. In it are described the naked-eye changes seen in the viscera—heart spleen, liver pancreas kidneys, brain, etc.—and the pathological histology of the lesions. H H S

GUNTHER (Carl E. M.) The Probable Vector of Endemic Typhus in New Guinea.—*Med J Australia* 1938, Aug 6, 25th Year Vol 2, No 6, pp. 202-204

Clinically and serologically "endemic typhus" of New Guinea resembles tsutsugamushi fever. The sera of patients agglutinate

Proteus XK and not 119. By analogy therefore the vector should be a larval mite. Larval mites are abundant in New Guinea where they are called in pidgin English *bush mokka*. In patients suffering from fever there is always a history of a recent stay in mite infested country. The primary sore is always found at one of the sites favoured by the mites. The ordinary bites of mites give rise to intense itching and are usually infected by scratching whereas the primary sores in fever cases are not itchy and are rarely secondarily infected.

Although practically every person who goes into the bush and swamps is bitten freely by mites only a few cases of fever are met with each year. This may be explained either by the supposition that the vector is one of the rare species of mites or that the common mite *Trombicula hirsuta* is only rarely infected. This mite is frequently found on man and is a parasite of birds but also of the bandicoot. The numerous mites from the birds would not be infective whereas the few derived from the rodents might be. Other species of mite may carry the infection from one rodent to another but they do not attack man.

D H

HEINEMANN (H.) Over reinfecties met pseudotypus (mijtekoorts) [Reinfection with Pseudotypus (Mite Fever)]—*Geneesk Tijdschr v Nederl Indië* 1938 Nov. 29 Vol. 78 No. 48 pp. 3037-3040. With 1 plate & 2 charts.

A European was bitten on 24th July 1938 by mites. He developed a small round ulcer on the thigh on the same day and fever a week later. The course of the affection was typically that of pseudotypus and this would not have required special notice but for the fact that the same patient had had an attack of the same disease a year previously. Little if any immunity seems to have been given by the first attack for the second one was even more severe. Out of 256 cases of pseudotypus recorded in hospital there were found the present case included three of second infection and the intervals to this second infection were 1 year, 2½ years and 18 months respectively.

W F Harvey

DAVIS (Gordon E.) COX (Herald R.) PARKER (R. R.) DYER (R. E.) A Filter-Passing Infectious Agent Isolated from Ticks. I. Isolation from *Dermacentor andersoni*. Reactions in Animals, and Filtration Experiments [DAVIS & COX]—*Public Health Rep* 1938 Dec. 30 Vol. 53 No. 52 pp. 2259-2267. II. Transmission by *Dermacentor andersoni* [PARKER & DAVIS]—*Ibid* pp. 2267-2270. III. Description of Organism and Cultivation Experiments [COX]—*Ibid* pp. 2270-2278. IV. Human Infection [DYER]—*Ibid* pp. 2277-2282. With 1 fig.

In the spring of 1935 200 ticks (*Dermacentor andersoni*) were collected from Nine Mile Creek about 30 miles from Missoula in Montana. These ticks were divided into four batches of 50 and each batch was fed on a normal gumeapig. One of the gumeapigs developed fever on the 12th day after the ticks had been placed on it and ran a high and continuous fever and died on the 20th day. Four cc. of blood was taken from this animal on the 2nd day of the fever and this was inoculated intraperitoneally into two other gumeapigs both developed a similar fever and both died. Post-mortem appearances

were similar in all three, namely enlarged lymph glands swollen dark red smooth spleen, and some injection of the testes and tunicae.

This infection has been maintained ever since in guinea pigs by the intraperitoneal or subcutaneous injection of blood or spleen of infected animals. When the inoculation was made subcutaneously there was a local inflammatory reaction at the site of injection. Thrice washed red cells from an infected guinea pig still retained the infection. Immunity to the disease was present for at least 115 days after the fever.

Filtration

Blood was taken from an infected guinea pig on the 3rd day of fever this was placed in citrate solution and centrifuged. The citrated plasma was then filtered through a Mandler filter and 1 cc. of the filtrate was injected into two guinea pigs. Both developed fever and died and both showed the typical post mortem appearances. Further filtration experiments on similar lines have conclusively shown that the infectious agent readily passes through Berkefeld V and W filters but it was not found possible to pass the virus through a Sertz disc. The spleen of an infected guinea pig was removed and placed in glycerine. From time to time portions were removed and emulsified and injected into normal animals. After 16 days in glycerine infection was produced in guinea pigs and there was evidence that the virus was still active up to 80 days. White rats and white mice were readily infected by the injection of blood or spleen of infected guinea pigs but rabbits and monkeys were resistant. Squirrels and chipmunks could also be infected with the virus.

Guinea pigs which had recovered from this virus infection were not resistant to infection with the viruses of typhus or Rocky Mountain spotted fever nor vice versa.

Transmission in Ticks.

A series of experiments was carried out on the transmission of the virus by means of ticks, *D. andersoni*. Larvae were fed on infected guinea pigs and it was found that nymphs and adults developed from these larvae were capable of infecting normal guinea pigs. Eggs were collected from some of these infected ticks and the larvae which developed from these eggs infected guinea pigs when they were allowed to feed. Clean nymphs and adults fed on infected guinea pigs were collected after feeding and emulsified and injected into normal guinea pigs these also became infected. blood was taken from the infected guinea pigs, the serum filtered and injected into other guinea pigs, which in turn became infected and showed the usual post-mortem appearances enlarged lymph glands and swollen smooth dark red spleen. When the infected tick emulsion was injected into guinea pigs which had recovered from the previous attack of the fever they did not react.

Description of Organism

Guinea pigs were infected and killed at intervals during the febrile period, smears were made from the tunicae and from the exudate on the enlarged spleen, these smears were stained by Giemsa stain. No "inclusion" bodies were seen but numerous minute delicate extracellular and intracellular pleomorphic Rickettsia-like organisms were observed. emulsion of spleen of an infected guinea pig was centrifuged and filtered and injected into two guinea pigs, both became

infected and the same Rickettsia-like bodies were found in stained smears of the spleen exudate in these animals. The pleomorphism of these small bodies is very marked rods bipolar rods diplobacilli filamentous forms chains of cocci and nests of cocci in the cytoplasm of cells were all noted.

These small bodies resemble typhus Rickettsia closely but are more slender and minute they also resemble *Bartonella bacilliformis* in Carrion's disease but are not seen in the red cells do not grow in Noguchi's medium and when injected into the eyebrow of monkeys no verruga nodules are formed.

In tissue culture the virus was readily cultivated and carried in transfer in subcultures the medium used was minced chick embryo tissue in human ascitic fluid. The small Rickettsia could be demonstrated in the tissue cells in every transfer. The conclusion is that the infectious agent isolated from ticks resembles Rickettsia in every respect except that it has not been found in the tissue of the ticks.

In 1928 NOGUCHI isolated from ticks collected in the same district in Montana a similar filter-passing virus. Although Noguchi found that monkeys could be infected with the virus it is quite probable that the two infections are identical.

A worker in the laboratory who had handled infected ticks and guinea pigs became infected with the fever. 5 cc of his blood taken on the 6th day of illness and injected into guineapigs proved infective and this strain of virus has been passaged for 20 generations in guineapigs. The serum of this patient neutralized the original strain of virus isolated from the ticks. There was no cross immunity between this human strain of virus and the viruses of typhus or Rocky Mountain spotted fever. It is probable that this new virus is similar to that of the so-called Q fever of Australia [see this *Bulletin* 1938, Vol. 35 pp. 62, 63].
D H

ARCHER (G. T. L.) *Proteus musar* isolated from a Mouse.—*Jl. Roy. Army Med Corps* 1938 Aug. Vol. 71 No. 2. pp. 106-108.

An organism isolated from the heart blood of a mouse in the laboratory was shown to have all the character of *Proteus musar*, alcoholized suspensions of this bacillus were agglutinated by *Proteus* O & K serum but not by H & 19 or H & 2. Cross agglutination and absorption tests carried out established complete identity with the type strain obtained from the Lister Institute.
D H

DENGUE AND SANDFLY FEVERS

PRÉCIS OF ABSTRACTS IN THIS SECTION

WAKIL and HILMY (p. 482) describe the Cairo epidemic of 2,594 cases of dengue in 1937 in which 60 deaths took place from complications in heart or lungs. MAGLIANO and AZZI (p. 482) describe an epidemic of dengue in Abyssinia in which two waves of morbidity occurred, separated by a period of about 10 days when no cases were seen. There were no deaths.

SANNER and DESTHIBATS (p. 483) describe the characters of dengue-like fevers in Dêgo-Suarez.

SHORTT PANDIT and RAO (p. 483) isolated the virus of sandfly fever from the sera of patients. The sera had been in cold storage for a month. Mixture of these sera with sera from convalescent patients inhibited growth. C W

WAKIL (A W) & HILMY (F) *Épidémie de dengue au Caire en 1937* [Epidemic of Dengue in Cairo in 1937]—*Bull. Office Internat. d'Hyg. Publique* 1938, Aug. Vol. 30 No. 8, pp. 1821-1841. With 1 map & 3 graphs. [25 refs.]

The epidemic commenced in the first week of September but the origin of the outbreak could not be traced. 2,594 cases were reported in Cairo itself and these represented about 92 per cent. of all the cases in the country.

The maximum number of cases was reported in the week ending 11th November and the cases ceased at the end of the year. There were 50 deaths due to various complications in heart or lungs. A full clinical description of cases is given. D Harvey

MAGLIANO (GIORGIO) & AZZI (ENRICO) *Epidemia di dengue sulle coste della Mignurtina durante le operazioni per la conquista dell'Impero* [Epidemic of Dengue on the Coast of Mignurtina during the Abyssinian Campaign.]—*Ann. di Med. Nav. e Colon.* 1938, July-Aug. Vol. 44 No. 7-8, pp. 337-344. With 1 fig. & 4 charts.

The earlier cases of the outbreak, which lasted from March-June 1936, were atypical and of an influenzal type: slight fever and joint pains, and rash so little in evidence as to be in some cases overlooked. The morbidity varied as shown in the accompanying graph: 10-12 per cent. in the early days of the outbreak, 18-20 during the acme, then a lull for some ten days and finally a descending incidence of 12-8 per cent. The author divides the outbreak into seven periods. First, extending over the first three weeks of March, characterized by mild and atypical cases; next the period of higher morbidity during the last decade of March and the first of April, followed by a rapid remission and complete absence of fresh cases, both these occupying about 10 days each. Then came a second wave continuing to rise to an acme during the first ten days of May, remaining at the new level for another ten days and during the next four weeks slowly declining. The whole outbreak, therefore, covered nearly four months. The actual number of cases is not stated. None was fatal though one officer died of heatstroke ten days after recovery from an attack of dengue.



Graphic representation of course of epidemic of Dengue from March to June, 1936, on the Coast of Mignurtina.

[Reproduced from the *Annali di Medicina Navale e Coloniale*]

H H S

SANNER & DESTRIEATS Contribution à l'étude de la fièvre à phlébotomes et des pseudo-dengues ("Dengue Like Fevers des auteurs anglais) observées à Diégo-Suarez. [Contribution to the Study of Sandfly Fever and "Dengue Like" Fevers observed at Diégo-Suarez.]—*Ann de Méd et de Pharm Colon* 1938. July-Aug-Sept Vol 38 No 3 pp 609-632. [12 refs.]

The dengue like fevers differ from true dengue by the habitual absence of a rash and the mildness of the pains these fevers are characterized by the slow pulse during fever the violence of the headache insomnia the frequency of relapses or recurrences and modification in the spinal fluid with marked effects on the nervous system weakness during convalescence tendency to haemorrhages and liver and kidney troubles
D H

SHORTT (H E) PANDIT (C G) & RAO (R Sanjiva) The Virus of Sandfly Fever in Culture and Certain of Its Properties.—*Indian J Med Res* 1938 July Vol 26 No 1 pp 229-239

Sera of sandfly fever patients were mixed with a small quantity of normal human serum and inoculated into the chorio-allantoic membrane of chick embryos. The technique followed was similar to that described by the authors in 1933. The virus was also grown in tissue culture consisting of embryo chick emulsion and Tyrode solution in 50 cc flasks. Twenty-seven sera in all were tested out of 13 pooled batches of sera (two samples in each batch) seven gave a growth of virus. These sera had already been in cold store for a month and had been five days on the journey from Peshawar to Madras. When the sera of convalescents from the disease was mixed with the inoculum and held in contact for 30 minutes growth on the egg membranes was inhibited. Inoculations were made into mice but without any definite results although the virus could be recovered from the heart blood and brain of the animals up to nine days after inoculation. Cultured virus was sent to England by air and was successfully subcultured on arrival there
D H

OROYA FEVER AND BARTONELLA INFECTIONS

PRÉCIS OF ABSTRACTS IN THIS SECTION

MACKENHIE (p 484) describes experimental infection with *Bartonella* cultivated from a patient with Oroya fever. A local lesion followed by a granuloma with lymphatic and blood spread and general (but sometimes delayed) symptoms of fever and anaemia, follow and subsequent trauma or intercurrent disease may determine the onset

PITTALUGA (p 484) discusses *Bartonella bacilliformis* transmitted probably by a Phlebotomus or possibly a tick, *B. muris* by rat louse or flea *B. canis* and *B. boris*. Splenectomy transforms a mild anaemia in rats infected with *B. muris* into a grave form. The rôle of the spleen and reticulo-endothelial system in protection is discussed, but it is pointed out that Carrion's disease in man is not comparable with the infection of animals by *B. muris* and *B. canis* or with that in monkeys caused by infection by *B. bacilliformis*

gave positive Weil-Felix reaction with *Proteus* OX19 and OXK and also agglutinated emulsions of *Rickettsia prowazekii*. After several subcultures there was a loss of virulence in the cultures on blood agar but this was re-established when the parasites were subcultured into semi-solid medium. [See also this Bulletin 1929 Vol. 26 p. 519] D H

WEIXMAN (David) On the Cause of the Anemia in the *Bartonella* Infection of Rats.—*Jl. Infect. Dis.* 1938. July-Aug. Vol. 63. No 1 pp 1-9 With 1 fig. [20 refs.]

The *Bartonella muris* anaemia of rats is due to blood destruction and is accompanied by haemolysis. When *in vivo* haemolysis occurs, haemolysis *in vitro* can be demonstrated. Extra corporeal haemolysis takes place with washed erythrocytes suspended in isotonic saline solution and also in serum.

The parasite *Bartonella muris* appears to be the direct cause of erythrocytolysis and thus of haemoglobin liberation for the following reasons —

- (a) It is present within or upon cells when lysis occurs.
- (b) When no parasites are visible there is no lysis.
- (c) Fragmented cells contain parasites.
- (d) The more fragile pale cells are the heavily-parasitized ones.

D H

ALSTED (Gunnar) Studies on Immunity in *Bartonella* Anaemia. *Acta Path et Microb Scandinavica*. 1938 Supp 37 pp 37-59 19 refs.

Previous work has suggested that protection from *Bartonella* infection is due entirely to splenic function yet these parasites disappear from the blood of rats, from which the spleen has been removed after recovery from the anaemia. Also in latent infections there is a mortality of 7 to 30 per cent. whereas in infection after splenectomy 97 per cent. of rats die. Heating kills some but not all of the parasites in blood taken from infected animals. If such blood is injected into rats it produces severe infections but after a prolonged incubation period. The length of the incubation period depends on the number of parasites in the injected blood but the severity of the attack does not. Eleven rats which had survived *Bartonella* anaemia were observed over long periods and it was found that the parasites disappeared from the blood in 28 to 36 weeks after the anaemia had ceased.

Ten of these rats were re-inoculated and 9 were resistant only one showed a slight infection. The spleens of these rats had previously been removed. It is obvious that there is a gradual production of immunity after recovery from anaemia this immunity is much more marked than that which follows a latent infection.

Nine rats which had showed a latent infection for about one month all died of anaemia after splenectomy but of 17 animals which had had latent infections for three months and were then splenectomized only 11 died. It is evident then that latent infections produce some degree of immunity apart from splenic function.

D H

MALARIA

PRÉCIS OF ABSTRACTS IN THIS SECTION

MIRRA (p 488) describes malaria in Entrea where there are hyper-endemic areas. The majority are *vivax* infections. SOEIRO and REBELO (p 488) found parasites (mainly *P. falciparum*) in 47.9 per cent. of natives and 5.7 per cent. of Europeans in 6451 examinations in Lourenço Marques.

DE BUCK (p 489) shows that *A. maculipennis messeae* and *atroparvus* are not sharply separated from one another according to the salinity of the breeding water and VAN TUIEL (p 489) from experiments with *A. maculipennis messeae* and *atroparvus* thinks that if the water in North Holland were rendered more fresh *messeae* would not thereby displace *atroparvus*. BEVERE (p 490) finds *A. maculipennis labranchiae* the most prevalent anopheline in the Foggia province of Italy. SCHLENOVA (p 490) describes the habits of *A. maculipennis maculipennis* the most important vector *A. plumbeus*, *A. bifurcatus* and *A. superpictus* on the Black Sea coast. DANILOVA and BOUDYKO (p 491) show that lagoons near the Sea of Azov are the most important breeding places in that endemic area. *A. maculipennis* is the principal vector. *P. vivax* infection is the commonest in summer and *P. falciparum* in autumn.

EVANS (p 492) shows that *A. maculatus* the local vector in Pahang can breed inside jungle which viewed from outside is apparently safe.

BOYD and KITCHEN (p 492) found that when lots of *A. quadrimaculatus* were fed on patients a significantly higher proportion of infection was obtained when exflagellation was found at the time of feeding than when it could not be demonstrated in *P. vivax* infections. No such difference was noted with *P. falciparum*.

GARNEHAM (p 492) considers that malaria stimulates a reticulo-endothelial response with phagocytosis of parasites in the placenta and that these macrophages are developed from lymphocytes. Relapses following parturition are probably due to removal, with the placenta, of a highly active reticulo-endothelial system. No instance of congenital infection was found in a large series.

BOYD *et al.* (p 493) by experiments on reinfection found that simultaneous inoculation with two strains of *P. vivax* delays the development of homologous immunity to either. SIOLI *et al.* (p 494) describe the course of *P. vivax* infections with known strains. The Madagascar strain was more effective in producing infection in mosquitoes than the two others used, and did so even when gametocytes could not be found in the blood.

BOYD (p 495) observed the density of *P. vivax* in the blood of patients undergoing primary infections, in relation to the course of the clinical attacks. After trophozoite inoculation maximum density was earlier and higher and the attacks shorter than after sporozoite infection.

BOYD and KITCHEN (p 495) report that 3 of 7 patients infected simultaneously with *P. falciparum* and *P. vivax* suffered relapses due to the latter. The primary attacks were characteristic of *P. falciparum* malaria. HEGNER (p 495) considers that the relative malignancy of *P. falciparum* (and *P. knowlesi*) may be due to the property of attacking mature erythrocytes rather than reticulocytes, which is not shown by *P. vivax*.

GERMAIN and MORVAN (p 496) record a long latent period in a patient in whose blood at the first attack both *P. vivax* and *P. malariae* were found. JELINEK (p. 496) describes malaria with long latent period and in one case clinical features simulating cerebellar tumour. AUDEH (p 497) considers that *vivax* malaria may have been the cause of orchitis in two patients. GASIC (p 497) found no value in sternal puncture in the diagnosis of malaria during periods of latency.

FAIGUENBAUM and GASIC (p 497) record the occurrence of agranulocytosis in a patient apparently due to quinine treatment. BORD and KITCHEN (p 497) found that treatment with quinine for a single day had considerable effect in inducing periods of clinical quiescence in patients infected with *P. vivax* especially if given late in the attack. No similar effect was found in *P. falciparum* infections.

DECOURT (p 498) discusses the dygonic action of quinacrine [atebrin]. This inhibits asexual reproduction and gamete formation of schizonts and suppresses morbid phenomena. For the maintenance of this action a dose of 0.3 gm. given thrice monthly is more effective than smaller doses given more frequently. FIELD *et al* (p 498) as a result of the treatment of a considerable number of patients with the three types of malaria, consider that atebrin muscinate though efficient in controlling acute attacks, is not to be recommended for routine administration.

CROFFA *et al* (p 499) prefer plasmoquine to cillonal in the eradication of gametocytes of *P. falciparum*. DE NUOVO (p 500) from observations in induced malaria considers that antimony tartrate shows marked gametocidal properties and may be considered as a causal prophylactic.

BISPHAM (p 500) working in an area with predominantly *P. vivax* infections, confirms the value of atebrin prophylaxis when $4\frac{1}{2}$ grains weekly are administered for four weeks or more. CHARBONNIER (p 501) found that in a post in French Indo-China although prophylactic quinine was not successful the addition of quinacrine and praequine [plasmoquine] once weekly produced marked improvement.

MIRRA (Gudo) Il problema malaria-colonizzazione in Eritrea. [Malaria and Colonization in Eritrea].—*Ann di Med Nav e Colon* 1938 Sept.-Oct. Vol. 44 No. 9/10 pp 428-436 439-443

This is a comprehensive description of Eritrea with special relation to conditions that are responsible for malaria endemicity. An account is given of the geographical divisions of the country, water courses, climate, rainfall, and population which numbers about 600,000 with five to the square kilometre. Breeding places of anophelines are described but no reference is made to species. Severe outbreaks of malaria in the past are referred to as are the results of limited malaria surveys carried out during the past few years from which it appears that there are places in Eritrea in which malaria is hyperendemic. For the country as a whole about 75 per cent of cases are *vivax* infections, 20 per cent *falciparum* and 5 per cent *malariae*. Norman White

SOENKO (Alberto) & REBELO (Antonio) Notas on the Epidemiology and Parasitology of Malaria (according to an inquiry now proceeding in Lourenço Marques).—*Socia African Med J* 1938 Nov 26. Vol. 12 No. 22 pp 841-847 [36 refs.]

The authors state that their work is based on 6,451 blood examinations in Lourenço Marques. Most of their paper however is concerned with

the published observations of other workers on such matters as the reasons for the rarity of *malaria* infections the possible cycle of development of malaria parasites in the reticulo-endothelial system multiplicity of strains of parasite with varying degrees of virulence and other matters on which the authors observations have little if any bearing The blood films were obtained from persons in apparently good health Parasites were found in 47.9 per cent of films from natives and in 5.7 per cent of films from Europeans Upwards of 95 per cent of infections discovered were *falciparum* *P. tenuis* was found cases were rare how many is not stated Three cases of *P. ovale* infection were noted The authors express a preference for the thin film method of examination A II

DE BUCK (A) Eine Lokaluntersuchung ueber das Brüten von Anophelen in Süß- und Brackwasser [Investigations on the Breeding of Anopheles in Fresh and Brackish Water in a Particular Locality]—*Rev. de Malariologia* Ser I 1938 Vol. 17 No 5 pp 344-357 With 1 fig French summary

The author has studied the distribution of two races of *Anopheles maculipennis* (*atroparvus* and *messeae*) in one small region in Holland. In a part of his area the water is consistently fresh in another part brackish

The two races are not sharply separated from one another according to the salinity of the water In the brackish water contrary to expectation 1 to 5 per cent of the eggs are *messeae* and that race contributes about the same proportion to the adults in the stables in the neighbourhood clearly therefore its females do not entirely refuse to lay their eggs in brackish water In the fresh water both races occur either one or the other preponderating to the extent of 80 per cent In those fresh waters in which eggs and larvae of *messeae* are most numerous larvae of *atroparvus* tend to die from an unknown cause. It appears, therefore that the females of *atroparvus* frequently put the eggs in a water in which a high larval mortality will occur

P A Burton

VAN THIEL (P H) Ueber das gemeinsame Vorkommen der Larven von *Anopheles maculipennis atroparvus* und *messeae* in Süßwasser [On the Joint Occurrence in Fresh Water of the Larvae of 4 *maculipennis* Race *atroparvus* and Race *messeae*]—*Acta Leidensia* (Scholae Med Tropicae) 1938 Vol. 12-13 pp 271-278 With 1 plate [Summarized in *Rev. Applied Entom.* Ser B 1939 Mar Vol 27 Pt 3 pp 50-51]

In Holland malaria is confined to the province of North Holland where *Anopheles maculipennis* 51g race *atroparvus* van Thiel, breeds in brackish water its transmission is largely due to the fact that the females of this race feed on man in autumn In the non malarial districts race *messeae* Flin. breeds in fresh water and it has been suggested that *messeae* would displace *atroparvus* if the water in the malarial districts were rendered more fresh The author therefore carried out 29 experiments with mixed batches of newly hatched larvae of the two races in various proportions The larvae were placed in tap water in dishes in three series, so that the surface areas per larva were 4.6 and 15 sq. cm., respectively, but the percentage mortalities in the three series averaged only 15, 17 and 14 In no case did one race dominate the other so that if the water in North Holland were rendered fresh, *messeae* would not thereby displace

atroperius. The results of the experiments were judged by identifying the pupal cases and the characters differentiating these in the two races are described, but the adults were bred out to make certain that the pupae were viable.

BEVERE (Lorenzo). Prime osservazioni sulla fauna anofelinica della Capitanata. [Anopheline Fauna of Foggia Province, Italy].—*Riv di Malariologia* Ser. I 1938. Vol. 17 No 6 pp 362-385 With 1 map [24 refs.]

This report contains a vast amount of information about the diverse conditions found in 18 communes of the Foggia province as these relate to anopheline prevalence and malaria endemicity in each. The anophelines found were *maculipennis* var *labranchiae* *atroperius* *datus* and *typicus* *A. superpictus* and *A. pseudopictus* *labranchiae* was much the most prevalent. A description is given of the climatic conditions, physical and chemical composition of the soil hydrographic conditions with chemical composition of ground and surface waters, anopheline breeding places agriculture domestic animals, the density of the human population and the prevalence of malaria. Works of bonification that are being undertaken are also referred to these as yet are for the most part only in the initial stage. N IV

SCHLENKOVA (M. Tb). Sur la biologie des anophèles des environs de Sotchi [Biology of Anophèles in the Neighbourhood of Sotchi].—*Med. Parasit. & Parasitic Dis.* Moscow 1938. Vol. 7 No 4 [In Russian pp 514-527 With 7 figs. French summary pp 527-529.]

Sotchi is in the Caucasus on the coast of the Black Sea. Four species of Anophèles are found there *maculipennis maculipennis bifurcatus plumbeus* and *superpictus*. The first named is the most prevalent and the most important vector of malaria.

The first male *maculipennis* was found on the 23rd of May and most females began to hibernate in October. This species breeds along the shingle covered banks of little rivers, in artificial pools and irrigation and drainage canals. It is most prevalent in August. The physiological age of females was determined by the size of the ampulla of the oviduct. The curve illustrating the frequency distribution of these measurements is asymmetrical. The first oöcyst infected mosquitoes were in the class 0.007 mm³ the first sporozoite infected in the class 0.035 mm³. The frequency of sporozoites increased with increase in size of the ampulla. Houses and stables serve as day resting places for *maculipennis*. Twenty per cent. of engorged females contained human blood. The oöcyst infection rate was 0.46 per cent. in July 6.18 in August and 5.04 in September. the sporozoite rates in these three months were 2.10 2.80 and 3.57. Sporozoites in September for the most part, showed signs of degeneration. The sporozoite rates for *maculipennis* caught in houses and stables respectively were almost identical and there was no evidence that female *maculipennis* after egg-laying had any preference for shelters previously visited. Gonotrophic disharmony was observed in September and October but not in the summer.

A. plumbeus is second in importance as a vector. It breeds in hollows of trees, in depressions among the roots of trees and in empty

tubs Its prevalence dependent upon rainfall was greatest in spring and autumn Its daytime resting places were most commonly hollows of trees and trunks of trees in thick forest well protected from sunlight—dark and damp places. Houses are visited only at night or at dawn The mosquitoes do not remain there during the day They are found in greatest number at the edge of woods near human habitations Female *plumbeus* only begins to display activity when the relative humidity is as high as 80 per cent and its activity increases with further increase of humidity At low temperatures with high humidity *A. plumbeus* attacks its victims with ferocity It is strongly attracted by domestic animals but in a bathing resort the percentage of *plumbeus* containing human blood was considerable This species will sometimes fly as far as 1.5 kilometres for its food. Of 282 females dissected two were infected.

Larvae of *A. bifurcatus* were found wherever there were pools fed by springs Rare in summer this species was prevalent in autumn and in spring it dislikes heat It has a marked partiality for the blood of domestic animals Only 5 per cent of engorged females contained human blood Commonly found in stables no specimen was found in inhabited houses
A. superpictus was found in very small numbers in houses and stables in the valley of the River Matsesta the most southerly point of the coast of the Black Sea at which it has been found hitherto

N IV

DAVILOVA (M I) & BOUDYMIKO (F A) Le rôle épidémiologique de 1 *Anopheles maculipennis* Weig et de 1 *Anopheles hyrcanus* Pall. dans les lagunes de la mer d Azov [Epidemiological Role of 4 *maculipennis* and 4 *hyrcanus* in the Lagoons of the Sea of Azov]—Med Parasit & Parasitic Dis Moscow 1938 Vol. 7 No 4 [In Russian pp 467-498 With 2 figs [12 refs.] French summary pp 498-500]

Large expanses of water and a warm climate with high relative humidity are favourable to the propagation of anophelines near the Sea of Azov Malaria is endemic The lagoons are the most important breeding places of anophelines they are very extensive and inaccessible to antilarval measures The borders of these lagoons with dense submerged vegetation reeds and rushes harbour very large numbers of *maculipennis* larvae *hyrcanus* breeds among the reeds In the marshes anopheline breeding is limited. Artificial collections of water though harbouring numerous larvae are of little malarial importance their extent is not great especially in dry seasons Similarly provisional collections of water formed by the river Protoka may contain many larvae but they quickly dry and only yield one generation of anophelines each season. The potential vectors found were *A. maculipennis* var *moscane* and *atoparvus* *A. hyrcanus* var *pseudopictus* and *A. bifurcatus* Localities near lagoons harbour more adult mosquitoes than do those near marshes or in the centre of the village *A. hyrcanus* was never found in daylight resting places in the latter situations prevalence in July *A. hyrcanus* appears in June and is most prevalent in the middle of August *A. maculipennis* caught in dwelling houses the sporozoite index was 0.45 and the oöcyt index 0.22 per cent

Houses and stables are the favoured daylight resting places of *maculipennis* thick clumps of rushes and reeds are those favoured by *hyrcanus*. The latter species enters houses however in numbers. *A. hyrcanus* is active in its natural shelters throughout the 24 hours it generally feeds in the open air.

All three forms of malaria were found in the village of Grinevskaja river infections are the most numerous at the end of summer *falciparum* infections the most numerous in the autumn. Children and adults suffer in equal proportions. The authors detailed and exhaustive investigations have led to the conclusion that *A. maculipennis* is the most important vector. A II

EVANS (I) An Outbreak of Malaria due to *A. maculatus* breeding inside Jungle at Raub Pahang, 1937—*Jl Malaya Branch Brit Med Assoc* 1938 Sept. Vol. 2 No. 2 pp. 85-87 With 4 figs on 2 plates.

The residential part of Raub is in close proximity to a belt of jungle. Malaria in Raub is carried by *A. maculatus*. *A. nimbrosus* has never been found in the locality. Control by oiling stopped short at the jungle edge. Increase in malaria incidence was eventually found to be due to *A. maculatus* breeding in exposed areas inside the jungle. The appearance of the jungle viewed from outside gave a false sense of security. Attention to these breeding places was rapidly followed by decreased prevalence of malaria. A II

BOYD (Mark F.) & KITCHEN (S. F.) Demonstrable Maturity of Gametocytes as a Factor in the Infection of Anophelines with *Plasmodium vivax* and *Plasmodium falciparum*—*Am J Trop Med* 1938. Sept. Vol. 18. No. 5 pp. 515-520

This is a record of the degree of infection developing in lots of *A. quadrimaculatus* applied once to patients harbouring *vivax* or *falciparum* gametocytes, exflagellation preparations being made on the occasion of each infecting feed. There were 230 lots infected with *P. vivax* and 168 with *P. falciparum*. Not infrequently lots of mosquitoes were successfully infected when exflagellation was not demonstrated. The technique for demonstrating exflagellation was similar to that of SHUTE described by JAMES (this Bulletin 1935 Vol. 32 p. 127). When exflagellation of *P. vivax* was observed, however a significantly higher proportion of lots with an incidence of infection above 75 per cent was obtained. Such a difference was not noted with *P. falciparum*. Exflagellation was more commonly noted in the spring and autumn than in summer and winter. This may be due to air temperature in winter the wards are artificially heated. Mosquitoes applied during spring and autumn showed larger proportions with heavy infection than did mosquitoes applied at other seasons. High gametocyte counts in *falciparum* infections facilitate the detection of exflagellation. A II

GARRHAM (P. C. C.) The Placenta in Malaria with Special Reference to Reticulo-Endothelial Immunity—*Trans. Roy Soc Trop Med & Hyg* 1938 June 25 Vol. 32 No. 1 pp. 13-34 With 2 charts & 8 figs on 2 plates (23 refs) (Discussion pp. 35-48)

In this paper the author gives an account of observations he has made on malarial infections of the placenta in 500 cases of pregnancy

in native women in Kenya. He has noted the very large number of parasites in all stages of development which may be found in the maternal blood spaces. This malarial infection stimulates a reticulo-endothelial response with phagocytosis of parasites similar to that which occurs in the spleen liver and bone marrow in general malarial attacks. Though the reticulo-endothelial cells or macrophages occur in large numbers in the malarial placentas there appear to be no normal cells in the placenta to account for these. The author supposes that lymphocytes reach the placenta in the blood stream and subjected to a malarial stimulus proceed to multiply and develop into phagocytic macrophages as is the case with the lymphocytes in the spleen. An attempt was made to stain the cells of the reticulo-endothelial system with trypan blue by giving to the mother intravenous injections of the drug. The dye was also transfused through the umbilical vein and applied to fresh smears of the placenta. In no case did the cells take up the blue dye though it was shown to penetrate the trophoblastic lining of the villi to stain the fibrocytes and reach the foetus which was always stained blue. The macrophages on the other hand show a marked affinity for neutral red. The fact that the cells which are chiefly concerned in the malaria immunity process fail to stain with trypan blue suggests that it may be erroneous to assume that the specific cells can be blocked with this dye.

In a long series of observations on foetal bloods in cases of heavy placental infections it was not possible to demonstrate in a single instance the passage of parasites from mother to foetus.

It was assumed that the relapses which followed parturition were probably due to the sudden removal with the placenta of a highly active reticulo-endothelial system.

In the discussion which followed the reading of the paper speakers referred to the possible or probable influence of a specific immune substance on the macrophages to the records of absorption of trypan blue by the somatic reticulo-endothelial cells and the indications that actual blockage thus took place to the theory that the parasite of malignant tertian malaria reproduces normally by binary fission rather than by schizogony; to the possibility that the placenta with its malarial infection and macrophage response was actually an extra corporeal depot which exerted no influence on the general immune processes of the body which were carried on by the spleen as had been the case before the development of the placenta.

The author of the paper finally replied to the various questions raised.

The whole paper which is illustrated by microphotographs is the most comprehensive one which has appeared on the subject of the behaviour of the placenta in cases of malignant tertian malarial infection.

C. M. Wemmon

BOYD (Mark F.) KUPPER (W. H.) & MATTHEWS (Choice B). A Deficient Homologous Immunity following Simultaneous Inoculation with Two Strains of *Plasmodium vivax*—*Amer J Trop Med* 1938. Sept. Vol. 18 No 5 pp 521-524

The authors have previously shown that patients successfully inoculated with a strain of *P. vivax* develop an immunity which renders them either entirely refractory to reinoculation with that

stram or if successfully reinoculated, they have no clinical manifestations of infection. The present paper records the results of inoculating three patients each with approximately equal numbers of trophozoites of two strains of *P. vivax* intravenously. After varying intervals following the spontaneous or induced termination of the resultant mixed attacks the patients were successively reinoculated with trophozoites of each strain alone. Five of these six reinoculations were followed by short clinical attacks. The primary attacks did not proceed to spontaneous termination but their duration was 53, 89 and 23 days respectively. It appears that the simultaneous presence of two strains delays the development of homologous immunity to either

N IV

SIOLI (F) KENTENICH (A.) & BOLDT (Erika) Weitere Erfahrungen ueber die Zucht der Anopheles und ihre Verwendung in der Malariabehandlung der Paralytiker [Further Experience in the Breeding of Mosquitoes and their Use in Therapeutic Malaria.]—Arch f Schiffs u Trop Hyg 1939 Jan. Vol 43. No. 1 pp 1-15 With 10 figs.

In the experiments described in this paper local mosquitoes, species not mentioned, were used for infective purposes. Various improvements in technique are mentioned since the last report in 1938 regarding moisture content of air and use of glass windows in mosquito cages. A certain type of rabbit is used to provide blood meals in the cages and a current of air against which mosquitoes cannot fly is of service during its removal. Rubber gloves are worn by the operator besides the curative action of induced malaria in G.P.I. patients,

the study of new drugs. Three strains of benign tertian parasites have been used: the Original Viennese strain, II, a Rumanian, and III the Madagascar strain, the latter two having been sent from England. The experiments described deal with the last strain, which has not altered its character by passage through human beings and mosquitoes in turn. Thirty-one patients were successfully inoculated out of thirty three attempts. In one case a single mosquito caused infection. The incubation period varied from 10-22 days. There was no relation between the number of bites and incubation time or in the character of the infection. A pure tertian type of fever was rare and generally alternated with quotidian. In ten out of 31 cases the fever subsided spontaneously, six of the 10 patients having been previously inoculated. All the patients had a temperature of 104° or over. In 14 cases parasites were noted before the appearance of fever in seven others the appearance of parasites and fever coincided and in a further seven cases parasites appeared after onset of fever. In twenty-one cases gametocytes were detected 8-20 days after the start of fever while in the remaining 10 cases they were absent, and this was so where fever disappeared without treatment.

Atebrin in 3x0.1 gm doses for 7 days and 8 days later in 3x0.1 gm. doses for 4 days was used in treatment. Quinine in 0.2 gm. doses was found useful in causing abatement of fever.

Regarding mosquitoes the Madagascar strain gave rise to a higher percentage of and more intense infections than, the others. Even in cases where the patient's blood failed to show the presence of gametocytes, infection in fed mosquitoes resulted. Details are given of the

work of the clinic in supplying infected blood and the apparent influence of blood withdrawal on temperature and duration of fever as well as on parasite counts is discussed.

J D Fulton

BOYD (Mark F) The Threshold of Parasite Density in Relation to Clinical Activity in Primary Infections with *Plasmodium vivax*—*Amer J Trop Med* 1938, Sept Vol. 18, No. 5 pp 497-503

The observations recorded were made on 77 cases of vivax malaria mostly of the McCoy strain in 56 of which infection was naturally induced (sporozoites) the remainder being infected by the injection of trophozoites. No elevation of temperature that failed to attain 100°F (37.8°C) was regarded as significant of malaria infection. A clinical reaction may be induced by *P. vivax* in densities in the peripheral blood of 10 per cmm. or less whatever the method of infection. Excepting the few days subsequent to the onset the duration of the clinical attack never exceeded the period during which the parasite density remained at 100 or more per cmm. generally, it was shorter in duration. Parasite densities in excess of 25 000 were uncommon a count as high as 50 000 was exceptionally rare. Densities above 25 000 were more common following trophozoite inoculation than in natural infection. After trophozoite inoculation the maximum density was usually observed within 10 days of the first detection of parasites after sporozoite inoculation it occurred later. Counts in excess of 15 000 were most often observed in cases that ran for four weeks or longer. Attacks following trophozoite inoculation terminated with higher parasite counts than did sporozoite induced attacks. Rarely were counts of 500 or less observed at the termination of the clinical attack. The final density bears no relation to the density which provoked the original clinical reaction. That attacks induced by trophozoite inoculation are commonly shorter than sporozoite induced attacks may be due to more rapid immunization by reason of higher parasite densities.

Λ II

BOYD (Mark F) & KITCHEN (S F) Vernal Vivax Activity in Persons simultaneously inoculated with *Plasmodium vivax* and *Plasmodium falciparum*—*Amer J Trop Med* 1938 Sept. Vol. 18 No 5 pp 505-514 With 5 charts.

The authors recently reported the successful inoculation of patients with *P. vivax* and *P. falciparum* simultaneously by multiple infected mosquitoes (see this *Bulletin* 1938 Vol. 35 pp 424-5). The present paper deals with the subsequent malaria history of these patients. Three of the seven cases in all of whom the initial attack was characteristic of *falciparum* had clinical attacks of malaria attributable to *P. vivax* in the following winter or spring. This renewed activity occurred 235, 236 and 282 days respectively after the onset of the original attack or 226, 174 and 233 days after its induced termination.

Λ II

HEGNER (Robert) Relative Frequency of Ring-Stage Plasmodia in Reticulocytes and Mature Erythrocytes in Man and Monkey—*Amer J Hyg* 1938 May Vol. 27 No 3 pp 690-718 With 20 coloured figs. on 1 plate [55 refs.]

By examining blood films containing the three common malarial parasites of man the author has studied the relative frequency of

falciparum infections. In this report only patients who received quinine on a single day in one or in divided doses, are considered. Quinine sulphate in capsules was given. A single dose of 20 grams of quinine had very little effect on the strains of *falciparum* studied—a dose of 11 grains or more exercised very decided action on the McCoy strain of *mxar*. The effect was more evident if the acute attack of malaria had lasted eight days or more when the dose of quinine was given. Single doses of 11 grains or more suppressed paroxysms and induced periods of clinical quiescence of varying duration, in the large majority of *mxar* cases. A declining trend in parasite density which lasted several days was also noted. Nothing comparable in *falciparum* infections was noted even after a dose of 20 grains. N IV

DECOURT (Ph) La lutte antiplasmodiale. Ses bases pharmacodynamiques. [Pharmaco-Dynamie Bases of Antiplasmodial Measures.]—Bull Soc Path Exot 1938 Oct 12. Vol. 31 No. 8 pp 760-771 With 4 charts

The mode of action of antimalarial drugs is complex. They exercise in varying degrees schizonticidal gametocidal and anti-sporogonic activities. The last named prevents the fertilization of gametes in the mosquito. In addition to these the author describes a dysgonic action—a conception that is both parasitological and clinical. Under the influence of this action schizonts lose almost entirely their powers of asexual reproduction and gamete formation. From the clinical point of view this action is manifested by the absence of morbid phenomena in spite of the presence of schizonts sometimes numerous in the blood. It is the dysgonic action of quinaquine which engages the attention of the author. The total dose of quinaquine necessary to produce this action at the beginning of treatment is variable depending as it does upon a parasitic factor and an organic factor. The optimum dose necessary to sustain this activity once it is established, is remarkably constant—it approximates 0.25 gm. for an adult. Dysgonic action lasts about three weeks but during this time it weakens progressively. If the parasite is but little aggressive a dose taken twice a month will be sufficient to prevent all morbid phenomena. More frequent administration is necessary if the parasite is aggressive the patient's resistance low and if reinfections are numerous.

The mere presence of quinaquine in the blood is insufficient to explain dysgonic action. A very small dose given daily is much less potent in this respect than the optimum dose given at much longer intervals although the total amount of the drug given by the former method may be greater. Thus a dose of 0.1 gm. given on 3 or 4 days in the week is less effective than one of 0.3 gm. given three times a month. The duration of this dysgonic action is not appreciably prolonged by increasing the optimum dose even by large amounts. There is no relationship between the curve of dysgonic action and that of the concentration of the drug in the blood or tissues. A IV

FIELD (J W) NIVEN (J C) & GUEST (C.) Clinical and Experimental Observations on Atebrin Musonate. With a Note by F E. BYRON.—Bull. Inst Med Res Federated Malay States 1937 No. 2. 24 pp. With 10 graphs. [12 refs.]

The object of the observations recorded was to compare the therapeutic value of atebrin musonate with that of quinine hydrochloride

in the treatment of acute malaria. The patients were Malay Indian and Chinese adults admitted to hospital. They were allotted to the atabrin musonate or quinine group alternately the only patients excluded from one or other of these experimental groups being afebrile cases patients with but few parasites in the peripheral blood, mixed infections or cases with a history of malarial treatment during the preceding three days. The minimum period of observation from the beginning of treatment was one week. Forming the atabrin musonate group were 234 patients 187 *falciparum* 84 *vivax* and 13 *malariae*. In the quinine group were 271 cases 184 *falciparum* 77 *vivax* and 10 *malariae*. The daily dose of quinine given was either one or two grams per 100 lbs body weight for 7 days 29 *falciparum* cases received quinine intramuscularly for 2 days followed by 5 days oral treatment. The remaining quinine cases received the drug by mouth. The doses of atabrin musonate varied from 0.2 gm. a day for two days to 0.3 gm. a day for 3 days some cases received 0.4 gm. a day for 2 days. The atabrin musonate was given intramuscularly except in 34 *falciparum* cases which received intravenous injections.

At the recommended dose of two injections of 0.3 gm. atabrin musonate efficiently controls an acute attack of any kind of malaria. It is a slightly more potent therapeutic agent than oral quinine. Trophozoites disappeared from the peripheral blood and temperatures fell somewhat earlier in the cases treated with atabrin musonate this was most marked in *vivax* infections. As a *falciparum* gametocide atabrin musonate has no advantage over quinine. It was not possible to obtain accurate data of relapse rates. It appeared that two injections of atabrin musonate without supplementary treatment are not sufficient to effect a permanent cure. The authors consider 0.375 gm. to be the optimum daily dose of atabrin musonate given on two successive days this dose controls an acute attack of malaria. Intramuscular administration is the method of choice. As far as local reaction is concerned this drug compares favourably with any other malarial remedy given intramuscularly. Three patients treated with atabrin musonate displayed alarming symptoms of nervous disturbance. One of these was very anaemic the drug is contra-indicated in such cases. The symptoms were temporary in all three cases and followed by no permanent effects.

Five hundred samples of urine from both groups were examined the urobilinuria associated with atabrin musonate treatment is not more marked than that associated with quinine treatment.

The conclusion is reached that in spite of its efficacy in controlling acute attacks of malaria the routine administration of atabrin musonate is not advisable. Oral therapy is the method of choice in the majority of cases [see also this *Bulletin* 1935 Vol. 32 p. 746 1936 Vol. 33 pp. 231 274 275 1937 Vol. 34 p. 776] V. IV

CHOPRA (R. N.) DAS GUPTA (B. M.) & SEN (B.) Studies on the Action of Synthetic Antimalarial Drugs on Indian Strains of Malaria. Cilonal in the Treatment of "Crescent Carriers." —*Indian Med. Gaz.* 1938 Nov. Vol. 73 No. 11 pp. 667-669

This paper describes the treatment with cilonal of four patients harbouring *falciparum* gametocytes. The authors found that a total dose of 0.35 to 0.4 gm. administered in doses of 0.03 gm. three times a day is usually sufficient to eradicate gametocytes of *P. falciparum*.

No ill effects were noted. In spite of this, however the conclusion is reached that plasmoquine is preferable to cibonal—a much smaller dose of the former is effective (0.02 gm. daily for three days). Such small doses of plasmoquine are not at all toxic. A II

DE VITO (Renato) Azione del tartaro stibato sui gametociti del *Plasmodium vivax* e del *P. falciparum*. Ricerche sperimentali. Experimental Research on the Action of Antimony Tartrate on Gametocytes of *P. vivax* and *P. falciparum*.—*Riforma Med.* 1938. Oct. 22. Vol. 54. No. 42. pp. 1599-1601. With 2 figs.

Sixty persons were inoculated with the blood taken from a patient infected with *P. vivax* at the height of a febrile attack, before the appearance of gametocytes. In two cases infection failed to materialize. Of the 58 successfully infected 6 received no treatment, 12 were treated with quinine, and 40 were treated with antimony tartrate. Bisulphate of quinine was given in the following doses, 1.5 gm. a day for the first week, 1 gm. a day for the second week, and 0.5 gm. a day for the third week. The antimony tartrate a 1 per cent. solution in distilled water was administered intravenously on alternate days, beginning with a dose of from 8 to 10 cc. according to the general condition of the patient, increased by 2 cc. to a maximum of 14 cc. The total amount received by each patient was from 120 to 200 cc. The number of patients in whose blood gametocytes developed were—4 of the 6 untreated control, 66.6 per cent. 7 of the 12 treated with quinine, 58.3 per cent. 4 of the 40 treated with antimony tartrate, 10 per cent.

In another series of observations four patients harbouring *falciparum* gametocytes and 5 patients harbouring *vivax* gametocytes were treated with quinine. Eight patients harbouring *falciparum* gametocytes, and 20 harbouring *vivax* gametocytes were treated with antimony tartrate. In the quinine treated cases the gametocytes decreased in numbers very slowly and the persistent gametocytes retained their normal morphology and staining characteristics. In the antimony treated cases the *vivax* gametocytes had disappeared from most of the cases after they had received 10 to 20 cc. and the *falciparum* gametocytes after aggregate doses of from 21 to 40 cc. Even with smaller doses the gametocytes of both species lose their normal appearance their contour becomes irregular, there is vacuolation of the protoplasm, dislocation of pigment, loss of colourability of chromatin and protoplasm and fragmentation. Antimony treatment also produces a marked diminution of splenomegaly. The author concludes that after small doses of antimony tartrate the patient loses the power of infecting anophelines and that the drug may be considered as a causal prophylactic. N IV

BISPRAM (William V.) Final Report on the Use of Atabrine in the Prophylaxis and Treatment of Malaria.—*Amer. J. Trop. Med.* 1938. Sept. Vol. 18. No. 5. pp. 545-564.

The author has previously reported good results from the use of atabrine in the control of malaria in Civilian Conservation Corps Camps in the Southern States (see this *Bulletin* 1937 Vol. 34 p. 218). His final report confirms opinions previously expressed. The personnel of every camp with an admission rate for malaria of two or more cases in a week were given a prophylactic dose of 4½ grains of atabrine a week.

for four weeks this period was extended if the number of cases still exceeded one a week. The vast majority of cases were *vivax* infections. The author concludes that if atabrin be used as a prophylactic under supervision men of susceptible age can live and carry on their various occupations in a highly infected area with a minimum of malarial infection and a maximum of effectiveness. Over 90 per cent of *vivax* carriers can be cleared of all parasites. Untoward reactions to atabrin are almost never encountered and when encountered are of a transient character

N II

CHARBONNIER. Emploi des médicaments synthétiques antipalustres au poste de Muong Boun. [Use of Anti-Malaria Synthetic Drugs in a Military Post.]—*Ann de Méd et de Pharm Colon* 1938 July-Aug-Sept. Vol. 36 No 3 pp 732-734

In spite of the regular administration of prophylactic quinine the post of Muong Boun has year after year suffered from very severe malaria during the hot weather months. From June to September 1937 inclusive the issue of quinine was reinforced by the administration to each member of the garrison every Sunday of quinacrine 0.2 gm and praequine 0.02 gm. There was a consequent marked improvement in the health conditions. There were no serious cases of malaria. Neighbouring posts which were not so treated suffered that year as severely as usual.

N II

MISCELLANEOUS

TROLLI (G) Paraplégie spastique épidémique Konzo des indigènes du Kwango d'après les médecins du Fonds Reine Elisabeth pour l'assistance médicale aux Indigènes. ["Konzo, Epidemic Spastic Paraplegia of the Congo"]—pp 1-34 With 1 map 1938 Brussels Fonds Reine Elisabeth pour l'Assistance Médicale aux Indigènes du Congo Belge 112 rue du Commerce

The disease here described bears resemblances in several respects to the A and B avitaminosis of Nigeria and the "central neuritis" of Jamaica [see this *Bulletin* 1919 Vol 13 p 372 1936 Vol 33 p 887 888 893 also *Bulletin of Hygiene* 1929 Vol. 4 p. 391 1933 Vol. 8 p 441 1934 Vol. 9 p 487]

The condition which is known locally by the name konzo attacks chiefly children below 10 years of age but adults also suffer. The onset is usually not always abrupt with pain in head and back, paraesthesiae, formication, and a sense of constriction in limbs and back and paresis to paralysis at first flaccid later (and occasionally from the outset) spastic there is muscular atrophy. There are in some cases disturbances of speech and of sight to actual blindness. It is rarely fatal but the sequelae are permanent.

The disease was first described in 1836 among the inhabitants of the Kwango district of the Belgian Congo. The population is sparse and largely nomadic their diet seems to be very varied nothing being refused from ground nuts, fungi and sugar cane to ants, caterpillars, rats, monkeys and palm oil. They also cultivate cassava, sweet potato and millet. It is recorded that they do not suffer from

poverty and destitution and that the less well-to-do are less subject to the affection described than those better off. Diagnosis is discussed beriberi is ruled out for the condition is largely spastic at all events in the later stages, and cardiac complications are not met with other suggestions are acute anterior poliomyelitis and laryngism. It is not uncommon for several members of a family to be attacked. Examination of the blood and of the spinal fluid revealed nothing of moment. The result of further study will be awaited with interest.

H H S

CORKILL (N. L.) Tropical Ulcer Observations on its Treatment and Cause.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939 Jan 28. Vol 32. No 4 pp. 519-532. With 3 graphs. [17 refs.]

A study of 94 completed treatments of tropical ulcer in the Nuba Mountains area of Southern Kordofan with a discussion of the aetiology.

The Report of the Sudan Medical Service for 1936 showed that after venereal diseases and trauma tropical ulcer ranked next to malaria as a cause of invalidity. The present study deals with patients, Nubas and Arabs admitted to three hospitals in the course of three years. Two forms of treatment are analysed (A) by codliver oil locally and vitamin A concentrate (Essogen) by mouth (B) any other local treatment and no vitamin, the respective recipients in completed cases numbering 49 and 45. The two groups are again divided into old and recent, the old being those with a six months history or recurrences. Analysis of the results shows that though there was little difference between (A) and (B) in recent cases in the old, or chronic cases there was in (A) compared with (B) an increase of 64 per cent. in the healing rate due to codliver oil or vitamin A concentrate or both.

The author writes —

Cod-liver oil appears to be an excellent routine dressing for all skin injuries for it is comfortable and popular and in recent lesions has a healing rate comparable with the average of pooled other treatments. In old and recurrent ulcers and those in which the destructive phase has ceased it is the treatment of election for it favours or causes rapid epithelialization with a minimum of scarring. It is perhaps more costly though perhaps not importantly so, for the time spent in hospital is reduced, and recurrence is less likely as the ulcer heals by epithelialization rather than by scar tissue.

A graph shows the temperature throughout the year admissions for tropical ulcer onsets, recurrences and origin by vesicle. The last three have a peak in May whereas the peak of admissions is in August the May peak is, he says, the annual acme of vitamin deficiency coupled with the hard labour of preparing and sowing the land under cultivation. The patients do not come for treatment till this period is over. The vesicle or papule he believes to be a thrombo-necrosis in a person in a state of malnutrition. He discusses the influence of diet and season. The Sudanese diets are mainly carbohydrate, and poor in protein and for six months in the year (period of intense dryness) deficient in vitamins A, B₂ and C. Another graph shows the healing rate (mm. per day) in relation to malaria and green grazing and a third the effect of malnutrition which is more pronounced in old, recurrent cases.

The author advises the administration of skim milk powder as a dietetic supplement but does not appear to have tried it.

A G Bagshawe.

ROY (B M) Cod-Liver Oil Treatment of a Carbuncle and Two Ulcers.—
Indian Med Gaz 1939 Feb Vol. 74 No 2. pp 93-94
With 3 figs.

Cod liver oil changed twice daily for about one week and thereafter once daily was used as a dressing for one large carbuncle and two ulcers of the leg. Complete healing took place in under three weeks in every case although one of the ulcers had been present for a year. No other treatment except quinine was given. Photographs show that the ulcers were of the usual extensive necrotic type and the carbuncle massive and it is stated that the patients asked for the oily dressing. This method is painless efficient and cheap. C II'

LASSMAN (P) Note préliminaire sur le traitement des ulcères tropicaux avec le sulfanilamide [Treatment of Tropical Ulcer with Sulphanilamide]—*Ann Soc Belge de Méd Trop* 1938 Dec. 31 Vol 18 No 4 pp 581-583

The author noted that ulcers in patients treated for various illnesses with Astreptine a sulphanilamide preparation healed with remarkable speed. He therefore treated 10 patients who had been in hospital with tropical ulcer for periods of from 3 to 13 months by the administration of 5 tablets each of 0.3 gm. four times daily. The ulcers rapidly showed healthy granulations and at the end of 3 weeks all were completely healed and the patients had left hospital.

In confirmation a further series of 30 patients with ulcers chosen by the alternate case method were so treated and the results compared with those of the 30 alternate controls treated by the usual methods. The sulphanilamide group showed 313 hospital days average 10 and were all cured. The controls showed 565 hospital days average 18 and one was still under treatment at the end. Only one patient had ill effects with skin eruption and temperature of 40°C. These cleared up on stopping the treatment. C IV

HULSHOFF (A. A) Klierkoorts [Glandular Fever]—*Geneesk Tijdschr v Nederl Indië* 1938. Oct. 11 Vol. 78 No 41 pp 2514-2524 With 3 charts & 1 fig

The cases of two patients formed the subject of this clinical lecture. The first was clearly one of true glandular fever the second had up to a time all the appearance of a true case and was on the point of being discharged from hospital when he developed a definite attack of malaria with ring forms in the blood.

The blood picture in all types of glandular fever is very characteristic with its relative and absolute mononucleosis in which there are present more large than small lymphocytes and many lymphocytes with polymorphic nuclei—kidney shaped, lobed and Rieder type. There are lymphocytes resembling monocytes, lymphocytes with intensely blue, sometimes vacuolated cytoplasm and lymphocytes resembling plasma cells. It is extremely difficult to give a name to the types present and they are often recorded simply as abnormal lymphocytes. It is this very varied lymphocytic picture which distinguishes glandular fever from lymphatic leukaemia in which the lymphocytes are of very uniform type and in relatively greater number. The first of the two patients had the glandular swellings the blood picture and the heterologous serum agglutination reaction (1-512) to sheep erythrocytes of glandular fever and as there were no throat symptoms

complained of was diagnosed as of septic type. The second case was specially interesting because in spite of almost the same set of symptoms the patient who had been examined for malaria with negative results ultimately did develop malaria tropica and was cured with a quinine-plasmoquine course of treatment.

The author concludes with the remarks — We learn thus from these two cases (1) how difficult even by very careful expert examination, the diagnosis of malaria tropica can be (2) how neither clinical data nor blood examination nor serum test are absolutely diagnostic of glandular fever

W F Harvey

- 1 KUBO (Michio) & BABA (Hiroshi) Studies on the Cause of the Endemic Dermatitis in Manchoukoo. (First Report.)—*Jl Oriental Med* 1938, Oct Spec. No [In Japanese pp 1189-1193 With 1 fig [11 refs] English summary pp. 173-174]
- 11 — — & GOMI (Tadakatsu) Studies on the Cause of the Endemic Dermatitis in Manchoukoo. (Second Report.)—*Ibid* [In Japanese pp. 1195-1202. With 4 figs. & 4 plates English summary pp 175-176] [Summary appears also in *Bulletin of Hygiene*]

1 Dermatitis is a troublesome condition well known among workers in the rice-fields of Manchoukoo and particularly in July and August. It affects only the legs and arms—parts which are immersed in the irrigation water. The symptoms are intense itching followed by a papular erythematous rash, occasionally becoming vesicular and later eczematous. In the early stage it is very suggestive of ground-itch from hookworm larvae or that set up by schistosome cercariae. Examination however failed to detect either of these but a number of mites belonging either to the Pediculoidinae or the Tyroglyphidae were present. The authors describe the mite. The local lesions are very like those of "grocers itch" or the "water itch" among Assam tea-plantation workers due to *Rhizoglyphus parasiticus* or the vanilla among those handling vanilla or lastly copra itch due to *Tyroglyphus longior*.

11 In this are recorded the results of experimental work to elucidate the cause of the dermatitis. First mites were collected by filtration of the infested water. Four species were obtained and each was tested. One belonging to the Tyroglyphidae when applied to the skin of a volunteer produced a military papular rash the others did not. Next the legs of volunteers were immersed in water containing grasses and rice plants, the plants being taken washed in well water and applied in more of the same well-water. Thirdly the suspected irrigation rice-field water was similarly tested on volunteers after the water had been filtered. In both these experiments the results were negative. Finally in a stream flowing through the infested area 25 boys stood with legs immersed, and 24 of them developed the dermatitis. Then, more similarly stood in the water after the mites had been filtered off, and none was affected, but when the filtrate was added to water immersion resulted in the production of the dermatitis. The lesions are therefore due not to chemical irritants in the water nor to grasses and plants but to the mite belonging to the Tyroglyphidae. The actual species has not yet been determined.

H H S

RAGAZZI (Giorgio) Il cloruro etile nella terapia medica della *Sarco-
psylla penetrans* [Ethyl Chloride in the Treatment of *Tunga
penetrans*].—*Arch Ital Sci Med Colon e Parassit* 1938 July
Vol. 19 No 7 pp 437-438

The author treated a patient whose feet were deformed by literally hundreds of chiggers by spraying the great toe with ethyl chloride. This was so successful that a moderate spray was applied to the whole foot which was then bandaged and the treatment was repeated on alternate days. The patient was cured in a week.

The dose for a single chigger is about 2 cc and bandaging is not necessary. The effect is probably due to toxic action rather than to freezing and this treatment is particularly useful for children.

C II

WANG (Lo-shan) The Action of Paipu *Stemona tuberosa* on Lice.—
Chinese Med J 1938 Aug Vol 54 No 2 pp 151-158

The author describes tests on paipu a Chinese drug which may be used for killing lice.

A watery extract of the plant paipu (*Stemona tuberosa*) has been used for centuries in China as an insecticide. The crude drug may be obtained from Chinese pharmacists.

The author says that 70 per cent alcohol only kills lice if they are immersed for periods of over two hours. He then tests extracts of the crude drug made in alcohol of this strength and finds that if 10 per cent of the drug is soaked in alcohol for three days body lice (*Pediculus humanus*) generally die after being dipped for three minutes. At higher concentrations the liquid kills on even shorter exposures though many of the lice survive for a day or two. Nits may be killed readily by the same solutions. Watery extracts however are much less efficacious. The alcohol extracts were tested on infested people and gave satisfactory results and it appears that the solution is not irritant. The exact action of the drug is unknown. P A Buxton

CAUSEY (O R.) Experimental Intestinal Myiasis.—*Amer J Hyg*
1938 Nov Vol 28 No 3 pp 481-486

PATTON and EVANS in 1929 stated that eggs of Calliphorinae when ingested by man probably would not hatch and larvae ingested would fail to develop. HERMS and GILBERT in 1933 described a case of intestinal myiasis caused by larvae of *Lucilia* *Calliphora* and *Sarcophaga* which they thought persisted for years. CHANDLER in 1936 gave as his opinion that some species of flies which develop as larvae in the faeces of man or animals may live and grow in the intestine. Others however maintain that the presence of larvae in the faeces does not necessarily mean that they came from the alimentary tract.

The experiments of KOMAREK showed that the larvae soon died in the absence of oxygen and he supported the view of PATTON and EVANS that Calliphorinae larvae cannot survive passage through the alimentary canal.

The author has carried out experiments on animals using larvae of *Lucilia sericata* *Phormia regina* *Calliphora erythrocephala* *Sarcophaga*

securifera *Cochliomyia macellaria* and *Drosophila melanogaster*. Larvae of one or other of these were given in food to dogs and cats, young and adult. In every case the larvae were found to be killed or immobilized in the stomach in three hours and those that passed on to the intestine were partially digested. In no instance did living larvae pass through. The symptoms which have been recorded as due to their presence in the alimentary canal must have other cause. H H S

SOLLIER (R) Sur un cas remarquable de myiase du conduit auditif par *Chrysomya bezziana* [Myiasis of the Auditory Meatus].—*Rev Méd Française d'Extrême-Orient* 1938. Oct. Vol. 21 No 8 pp 1016-1018.

MA SALS (Ch) Discussion de l'article du Dr SOLLIER.—*Ibid* p 1019

The author tells of a child of four years brought to hospital on account of ear discharge and pain. Examination revealed larvae and in the course of four days 87 were removed and found to be larvae of *Chrysomya bezziana*. The unfortunate patient was also heavily infested with *Ascaris* and *Trichuris*. Dr Sollier discussing this case speaks of other instances of myiasis in Indo-China due to *Chrysomya megacephala*. H H S

BERTMAN (D S) A Note upon Myiasis due to the Larvae of *Cordylobia rodhaini* Geddes.—*Ann Trop Med & Parasit* 1938. Dec. 21 Vol 32 No 4 pp 431-435 With 2 figs [17 refs]

Larvae of *Cordylobia rodhaini* are not very uncommon in animals they have been found causing myiasis in antelopes, *Cephalophus dorsalis* and *C grimmii*. In the rodent *Crucetomys gambianus* a rat *Rhynchocyon cinnamomeus* a squirrel *Heliosciurus punctatus* and others. Records of infestation of man are however rare. MACFIE in 1917 noted one in a native at Accra, and in 1932 SYMES and ROBERTS reported one in Kenya. Other possible cases occurred in the Belgian Congo (1910 and 1916) in Uala and Ngoko French Equatorial Africa (1913). The case here recorded is that of a man in Mamfe Cameroons from whom 16 larvae were taken and four of these were sent to the Liverpool School of Tropical Medicine for identification. They came from pustules on the neck and forearm of a man of 51 years. The specimens proved to be third instar larvae of *C rodhaini*. One of these and a corresponding stage of *C anthropophaga* are depicted and the differences are detailed in the text. H H S

JOYEAN (Ch) SAUTET (J) & ARTAUD (P) Sur un cas de myiase rampante [A Case of Creeping Myiasis].—*Bull Soc Path. Exot* 1938 Dec 14 Vol 31 No 10 pp 822-824 With 1 fig

A child of 11 months who had been staying during the summer in Corsica was brought by its mother because she had noticed certain skin lesions for a fortnight. At the external superior angle of the left scapula was a subcutaneous raised ridge, tumorous, dark at one end, not inflamed. At the upper part of the front of the right arm was another similar lesion and on the right cheek a similar but larger and inflamed ridge, scratching of which had produced an impetigo-like sore. The contents of the two first were removed and proved to be

larvae of *Gastrophilus haemorrhoidalis*. The third gradually cleared up by local treatment with Dakin's solution. In the summer the child had lain on the ground with little or no covering.
H H S

FIALHO (Amadeu). Blastomycose do tipo Jorge Lobo [Blastomycosis of the "Jorge Lobo Type"]—*Hospital* Rio de Janeiro 1938 Oct Vol 14 No 4 pp 903-918 With 10 figs. [14 refs.] French summary

In 1933 Jorge Lobo published (*Anais Brasileiros de Dermat e Sif* No 46) the case of a man of 52 years who for 19 years had had a painful nodule over the sacrum. It was removed surgically, but two years later recurred and lesions became multiple, mostly of a keloid character, but some had a thick purulent discharge. Jorge Lobo grew from this a peculiar blastomycete on Sabouraud's medium. From the case described in the present article the same fungus was grown. The patient was a white man, a native of Brazil, in poor circumstances, who twelve years before had noticed two painless tumours of the right pinna. After growing for some years they had not increased in size and had not affected his general health. One on the posterior aspect was as large as a hen's egg, reddish violet in colour, lobulated but made up of masses from a millet to a hazel-nut in size. From the lobule was another of similar character, both were pedunculated and painless. They were removed and the wound healed up in a month. The characters of the fungus in the tissues and on growth on artificial media are detailed and depicted. The elements are spherical, on an average 10μ in diameter, with a thick capsule, often in short chains or small groups with giant cells at the periphery. As it appears to be a new type of mycosis the author suggests naming it the Jorge Lobo type after its first discoverer.
H H S

DICKSON (Ernest C) & GIFFORD (Minnie A.). *Coccidioides* Infection (Coccidioidomycosis). II The Primary Type of Infection.—*Arch Intern Med* 1938 Nov Vol 62, No 5 pp 853-871 With 7 figs. [14 refs.]

The first communication by the author on this subject has been referred to in this *Bulletin* [1938 Vol. 35 p 459]. In the present one is described the clinical and pathological condition. Infection is by inhalation of chlamydospores and the primary localization is pulmonary. A common locality is the San Joaquin Valley, California, and the disease goes by the name of valley fever or desert fever. In 16 months from 1st January 1938 75 physicians reported 354 cases. The early symptoms are those of a severe cold or influenza, with headache, general pains, pain in the chest or throat, cough and perhaps conjunctivitis. The sputum varies in quantity and may be bloodstained. After a temporary improvement and about 8-15 days from the onset erythematous nodules develop, mostly on the shins, but also on thighs and at times on scalp and arms and upper part of the thorax; they fade in 48-72 hours leaving brownish pigmentation. Diagnosis is rarely made till this rash appears. A ray examination may reveal pulmonary opacities suggestive of tuberculosis and enlargement of the hilar glands. The reaction to coccidioidin, a specific

antigen prepared from the fungus, is positive and may be very marked. A large majority of the patients recover completely but occasionally a coecidioidal granuloma may develop and cause death with symptoms of meningitis.
H H S

DICKSON (Ernest C.) Primary Coecidioidomycosis. The Initial Acute Infection which Results in Coecidioidal Granuloma.—*Amer Rev Tuberculosis* 1938. Dec. Vol. 38. No 6 pp. 722-729 [20 refs.]

A further account of this interesting condition of which the author has made a special study. It is now close on ten years since he reported on the *Misery of Tuberculosis by Coecidioidal Granuloma*. He has shown that the main endemic site is the San Joaquin Valley California. By 1931 of 298 cases, 254 had originated in that State and by 1938 of 450 cases in California 224 had died. It has been observed also in cattle and sheep but no record is known of animal to man, man to man, or man to animal infection. That infection can occur by inhalation of spores was proved in the author's laboratory where a worker inadvertently became infected by inhaling over an open Petri dish culture. Early symptoms are of an "influenzal" type, with fever (100-104°F) and general aching and malaise followed by bronchitic symptoms and sputum mucopurulent and at times blood-streaked. In 8-15 days an erythematous rash like erythema nodosum, and known as "the bumps" appears, commonly on the shins, but it may occur elsewhere. X-rays of the chest reveal hilar shadows. Most patients seem to recover completely but some develop a granulomatous condition of the lungs and of these the fatality is about 50 per cent.
H H S

HYMES (Hyman E.) Coecidioidal Granuloma.—*Unders Med* 1939 Jan Vol 38 No 1. pp 19-21 With 4 figs

HARE (K. P.) Preliminary Report on an Experiment in Coolie-Line Sanitation.—*Indian Med. Gaz.* 1938. Oct. Vol. 75 No 10 pp 609-611 With 3 figs.

The three major scourges of the Assam Valley tea estates are malaria dysentery and hookworm disease. The helminth infestation rate is nearly 100 per cent. The installation of tube well water supplies has reduced the incidence of dysentery and some other intestinal infections. Communal latrines of several types have been tried but all were disapproved by the coolies and seldom used. Recently bore hole latrines one for each family have been installed in one coohe line with a total population of 130. The dwellings in this line are semi-detached and the latrines were accordingly built in pairs. Squatting plates set in cement surmount the bore-holes which vary in depth from 14 to 20 feet. The walls of the latrine were built of sundried brick, except for the foundation and two corner pillars which were made of hard brick. Winged walls obviated the necessity for a door and there was no roof. The absence of roof lessened cost, allowed cleansing of the squatting plate by rain and met the coolies' sentiments as to the

impropriety of defaecating in a house. Such latrines can be constructed at a cost of about 10 rupees (15s.) per family. They have been popular and the coolies take a pride in keeping them clean.

Norman White

WATSON (Malcolm) *Modern Tropical Hygiene*—Reprinted from *Post-Graduate Med J* 1938 Nov 8 pp

This article by laying stress on certain main features on the application of principles and passing over or merely implying details serves a very useful purpose though it does not adduce—it does not pretend to—any fresh evidence or suggest new measures. Sir Malcolm Watson to illustrate his theses takes first malaria the prevention of which in Malaya particularly is so largely due to his work and advice second trypanosomiasis and third plague as examples of infections transmitted by different genera of vectors.

Under the first he speaks of the surprisingly good results in a small town on the Malay Peninsula [? Klang] in the opening years of the present century following properly planned and executed drainage schemes. A few years later in 1909 abolition of breeding sites for mosquitoes was effected by putting in pipes underground all streams and springs within half a mile of inhabited buildings the vector having been found to be a mosquito which selected fast running water for oviposition. In fact on the principle of *autres pays autres mœurs* from the Anopheles view *species sanitation* (a name given by the Dutch) found successful application when scientifically controlled. The author shows what is well known but not always acted upon that large scale research and reclamation need the whole-hearted co-operation of the administrator the medical officer the entomologist the engineer the forest officer the agriculturist, and a point not to be forgotten or minimized, the tribes who own the land.

In 1901 in Klang and Port Swettenham deaths from fever numbered 368 out of a total of 582. Anti-malaria work was then begun and by 1905 fever accounted for only 45 deaths and the benefit as regards other diseases is shown by the fact that total deaths were but 113 or less than one-third of those due to fever alone four years earlier. This work it was which basically made feasible the construction of the Naval Base at Singapore.

The economic effects are best expressed in the words of the Governor in 1926 —

It must be obvious to all who are acquainted with the conditions that prevailed in the Malay Peninsula during the concluding decades of the nineteenth and the opening years of the present century that developments such as the rubber industry which in so short a space of time has spread over so enormous an area would have been totally impossible unless the danger of malarial infection had first been successfully combated. Between 1920 and 1930 the British Empire produced 75 per cent. of the world's rubber and America consumed some 300 000 tons a year.

Similarly speaking of sleeping sickness, the author tells of twenty-one species of tsetse in Africa and of the value of—more the necessity for—species sanitation for exterminating or at least preventing the spread of the fly.

The article is an instructive summary of these aspects of present-day tropical hygiene.

H H S

ACHARD (Ch.) Voyage médical en Afrique noire (Congo belge A.E.F. Cameroun) [Medical Tour in Belgian Congo French Equatorial Africa and Cameroons.]—*Bull Acad. Méd.* 1938. Dec. 6. 102nd Year 3rd Ser Vol. 120 No 36. pp. 381-399

The author compares the staff of doctors in Belgian Congo and in the French African Colonies. With the French, all go through the same medical training during which they acquire *esprit de corps* and make life-long friendships. In the Belgian Congo many of the doctors are foreigners the only criterion is the possession of a diploma equivalent to the Belgian doctorate. Consequently they meet only during the course of instruction at Antwerp in tropical medicine. They do not form a corps subject to a common discipline and they enter the service not as a lifelong career but with a view to returning to Europe. He notes also that many of the doctors in Belgian Congo are in the employ of commercial companies or of religious missions or of private societies. An interesting account of the medical organization of the two French Colonies does not lend itself to summarization. It is particularly noted, however that in French Equatorial Africa there is a serious deficiency in native personnel. Indeed, it is stated that out of 641 *infirmiers* chosen as suitable for stations without doctors 10 were set apart of whom only three passed a test and those proved to be "without medical value." Instruction must be organized from the primary school upwards.

A brief account is given of the diseases met with in the two French colonies.

A G Bagshaw.

MEDICAL AND SANITARY REPORTS

HONG KONG (1937)

Hong Kong is one of a number of islands off the south-east coast of China, at the mouth of the Canton River about 91 miles south of Canton and 40 east of Macao. Hong Kong is 11 miles long and from 2 to 5 miles wide and has an area of about 32 sq miles. It is separated from the mainland of China by the Lyceum Pass. The peninsula of Kowloon on the mainland area 2½ sq miles forms part of the Colony together with the adjacent New Territory. The whole Colony has an area of about 345 sq miles.

Introductory—In previous Summaries attention has been drawn to the fact that so often the text of the Report has remained unchanged year after year (see this *Bulletin* 1936 Supp p 197* 1937 Supp p 203* and 1938 Supp p 214*). It is pleasing to note that the Report for 1937 conspicuously avoids the repetitive methods characterizing its predecessors and strikes an original note by introducing appropriate and informative discussion of the outstanding features of public health experience and discriminating commentaries upon the components of public health organization in the Colony for the year under review. It is of no little significance to note that instead of requiring a considerable extension of printed matter for the presentation of these welcome features space has been economized with such notable success that without sacrificing any feature meriting inclusion by comparison with its immediate predecessor the 1937 Report is a slimmer volume by 60 pages thus representing a saving of about 27 per cent.

Vital Statistics—This section has undergone complete revision. The difficulties attending attempts to make an annual estimate of the Chinese population—difficulties enormously increased for the year under review when a serious refugee problem developed as the result of the Sino-Japanese disturbances—are discussed together with a brief description of the system applied for the registration of births and deaths. As an example of the importance of the part played by local customs or practices in influencing the interpretation of assembled facts and of the value of explanatory text in such connexion a brief note relating to the birth registration among the Chinese population in Hong Kong is of particular interest. It is explained that partly as a result of ignorance or laxness and partly owing to the Chinese custom of postponing the event until the child is in its second year birth registration is still incomplete*. On the other hand, since the outbreak of Sino-Japanese hostilities the tendency has developed amongst the Chinese to secure registration of births in Hong Kong as a preliminary step towards claiming British nationality even when the evidence of local birth is of the most slender.

[But it is to be noted that the Chinese method of reckoning age adds a variable number of months to the true age one year being added at the time of birth and another on the first subsequent Chinese New Year's day so that a child born say in January 1937 is said to be one year old at birth and two years old on the Chinese New Year's day in February 1937 and one born say in March 1937 remains one year old up to New Year's day in February 1938 when it becomes two years old by Chinese reckoning. A formula and tables for converting Chinese ages to their European equivalents are given by STEVENSON and P'AN MINO Tzu in the *Chinese Medical Journal* 1926, Vol 40 pp. 128-130 1207.]

The relevant vital statistical data for 1937 may be summarized as follows —

Estimated Populations

Item	Island of Hong Kong	Kowloon and New Kowloon	New Territories	Maritime	Totals for the Colony
Non-Chinese	9,847	10,887	478	1,572	22,882
Chinese	437,932	339,866	107,052	100,000	984,850
Totals	447,829	350,223	107,828	101,372	1,006,682

Births, Deaths, and Infant Deaths

Item	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I M R.
Non-Chinese	692	30.6	244	10.8	30	45.9
Chinese	31,611	32.1	34,391	34.9	11,620	378.0
Totals	32,303	22.1	34,635	24.4	11,650	369.4

The registered births include 744 post-registrations after 12 months, viz 705 Chinese and 39 Non-Chinese these have been deducted when calculating the infant mortality rates. As regards registered deaths the monthly average for the first seven months was 2,349 and for the last five months 3,638. The refugee problem and the typhoon were largely responsible for the increase (see also hereafter under *Public Health*).

European Officials resident in the Colony numbered 940 with an average number resident of 918. Seven were invalided and three died.

In an Appendix to the Report under review the Registrar-General supplies the demographic facts for 1937 in considerable detail.

Maternity and Child Welfare Work.—In Hospitals under Government and voluntary control 358 beds were available for maternity cases in 1937 while additional accommodation was also available in a large number of maternity homes of the latter 73 were inspected during the year. At Government Hospitals 4,230 women appear to have been treated for diseases of pregnancy and the puerperal state (with 14 deaths) 3,879 being cases of normal labour. At Chinese Hospitals among 6,439 cases (38 deaths) 6,079 were cases of normal labour. Large numbers of ante natal and other cases are seen in the out-patient departments of the Maternity blocks of the various hospitals and at Government and Chinese Dispensaries.

As from the 1st January 1937 the practice of midwifery habitually and for gain (by unregistered persons) became a punishable offence. "Wan P'os" or handy women who had practised midwifery in Hong Kong for two or more years previously and who enrolled as midwives were exempted from this prohibition. 111 Wan P'os took advantage of the concession and were enrolled. At the examinations of the Midwives Board, 37 candidates were successful at the end of the year the names of 395 women were on the Midwives Register. The

16 midwives employed by the Medical Department provide free services at the homes of poor women and children and when not engaged in maternity and child welfare work assist in first aid work at the dispensaries.

Ante-natal and infant welfare work continues to be carried out at a large number of centres. Personal hygiene and mothercraft are taught to the women attending these centres.

School Hygiene—The *School Hygiene Branch* (comprising one European and two Chinese Health Officers a part time Lady Medical Officer and five Nurses) is responsible for the medical supervision of school-children and the inspection of school premises. With this limited staff responsible for a school population exceeding 86 000 attending over eleven hundred schools it is clear that it is possible to examine only a small proportion of the children. During the year 5,802 medical examinations were carried out in 18 Government schools. [There are 21 Government schools 19 Grant in Aid schools and 1 137 private schools in the Colony.] Dental defects and visual disorders were the conditions most frequently met with. The establishment of a School Dental Department under the charge of a Government Dental Surgeon is recommended. At the various School Clinics attendances of scholars for examination and treatment totalled 2 780 while in addition 76 visits were paid by School Nurses to the homes of scholars.

At the request of the Education Department a large number of premises being used as schools (presumably as private schools) were inspected and many of them found to lack the elementary amenities demanded for the proper accommodation and instruction of young people. It is hoped to amend existing legislation on the subject of school hygiene to ensure that reasonable standards shall be maintained in all schools for as the Report rightly observes. It cannot be emphasized too strongly that by far the best method of teaching hygiene to scholars is by ensuring that the school premises themselves are satisfactory from the public health standpoint.

Public Health Sanitation etc—Dr P S SELWYN-CLARKE the newly appointed Director of Medical Services describes the exceptional difficulties with which the public health authorities had to contend and the unusual factors which combined to influence adversely the health of the community and to give rise to an increased amount of morbidity and mortality during the year under review. The continuance of the Sino-Japanese hostilities and their increasing intensity drove large numbers of refugees to seek a haven in Hong Kong their influx served to aggravate insanitary conditions in the already congested urban areas. Refugees from areas in China where health services had become disorganized brought with them the seeds of dangerous infections—disastrous cholera and smallpox epidemics resulted. In September a typhoon of exceptional severity devastated the Colony and while no accurate estimate of the loss of life is possible it may be noted that the bodies of some 490 persons who had been killed or drowned were picked up along the harbour foreshore. Even the most adequately staffed and wisely organized public health service would have found it difficult to maintain essential services and at the same time successfully cope with a series of calamities of this order but in Hong Kong the anomalous arrangements underlying some of the components of public health administration (see this *Bulletin* 1935 Supp p 191*) must have served to intensify the problems of efficient control. The

whole of the European and Asiatic Sanitary Inspectorate while *theoretically* grouped round the Health Officers in actual *practice* are not controlled by Medical Officers of Health but by a layman the Chairman of the Urban Council of Hong Kong. The present system is unsatisfactory from every point of view—Medical Officers of Health working under these conditions may be likened to Army Officers endeavouring to carry out their complex duties deprived of their N.C.O.s. A more effectively organized and adequately staffed sanitary inspectorate *under the direct control of the Medical Officers of Health* would have been able to deal more successfully with such dangerous infections as smallpox and cholera which during 1937 and in recent years have exacted so heavy a toll of life and suffering. Re-organization of the Health Division with the sanitary inspectorate under the direct supervision and control of the Medical Officers of Health is urgently recommended.

Anti-malarial work continued to be carried out under the auspices of the Malaria Bureau with unabated energy. In the report of the Malaria Bureau these activities are described in detail.

The objectionable bucket system of *sewage disposal*—which continues to function in the majority of tenements and shop-houses—and local methods applied for the collection and removal of night-soil are the subject of description and criticism. The present systems constitute grave sources of danger to the public health and steps are being taken to investigate the possibility of introducing drastic changes which envisage sewer disposal. Methods of *refuse disposal* are discussed and the defects of existing arrangements exposed. The system is capable of improvement and steps are being taken to this end.

The completion of the Shing Mun Jubilee Dam during the year marked a notable stage in the development of public health utilities in the Colony. *Water supplies* are now adequate for the impounding reservoirs (8 on the island and 5 on the mainland) have a combined storage capacity of 5,971 million gallons.

Matters concerned with *housing and town planning* are discussed at some length and various recommendations for future work in this field are outlined. These include new legislation to control town planning etc. and schemes for slum clearance. It may be noted that at present the Sanitary Department (see above) has little or nothing to do with housing other than the removal of obstructions.

During the year special bye-laws were drafted restricting the sale of certain *foods and drinks* with a view to minimizing the risks of infection through their use. Draft legislation which sought to make the pasteurization of milk compulsory met with considerable opposition. The proposals will probably become effective in 1939. Much information of value is expected to be made available following the investigations of the *Nutrition Research Committee*.

The curiousness of organization characterizing the Sanitary Department (see above) are seen in another direction. Health conditions in markets are under the control of the Colonial Veterinary Surgeons instead of under the Health Officers. Until the reorganization of the Health Division has been carried out and the sanitary inspectorate brought under the supervision and control of Medical Officers of Health, the effective *training of sanitary personnel* cannot be provided for.

Port Health Work—Services continued to function as usual. Due to the Sino-Japanese disturbances a decrease in the number of ships

entering the Port is recorded. The principal items of work concerned with shipping during the year may be summarized as follows —

British ocean-going ships entering and clearing	4,322
Foreign	5 202
Other vessels entering and clearing	24 258
Total tonnage dealt with	36 191 724
Emigrants examined	245 488
Emigrants rejected	1 153

Several new *air services* were inaugurated during the year no cases of infectious disease were discovered in passengers or crews of aircraft. The volume of aerial traffic dealt with during 1937 may be gauged from the following data —

	<i>Arrivals</i>	<i>Departures</i>
Aircraft	388	395
Crews	1 150	1 133
Passengers	1 929	1 756

Hospitals Dispensaries etc.—In the words of the Report under review The outstanding event in the year as regards improved hospital facilities was the opening of the Queen Mary Hospital which replaced the old Government Civil Hospital built in 1874 and which was closed on the 30th of June 1937.

The Queen Mary Hospital, which embodies all the latest improvements in hospital construction and equipment has accommodation for 546 beds an Isolation Wing consisting of nine small wards accommodates 22 patients. About a quarter of the beds in the new hospital are allotted to the Medical, Surgical and Gynaecological and Obstetrical clinical units of the Hong Kong University. Private practitioners are privileged to make use of the Maternity Wing for the treatment of their own cases.

The first patients were admitted in May 1937 from the Victoria Hospital by the end of June all the patients had been transferred to the new hospital from the old Government Civil and Victoria Hospitals.

The returns for Government and Chinese Hospitals are presented in *Appendices* to the Annual Report. For present purposes it must suffice to summarize briefly the record of the year's work by stating that to *Government* hospitals during 1937 admissions numbered 17 832, cases treated 18,275 and hospital deaths 1 637. Out patients treated at Government Hospitals exceeded 130 000 these are exclusive of out patients treated at special clinics dispensaries etc. At *Government Dispensaries* alone 59 618 patients were dealt with.

A new and informative account of the origins and subsequent development of the *Chinese Hospitals and Public Dispensaries* is a feature of the Report under review. Dangerous overcrowding characterizes many of the Chinese hospitals and it is observed it is not at all uncommon

to see two patients young and old in the same bed five adult women in two beds pushed close together patients lying all over the ward floors so as to render separation of types of disease and medical attention and nursing matters of extreme difficulty. In one case 61 patients were found in a ward of 12 beds! This distressing state of affairs is in urgent need of reform and it is hoped steps may be taken to improve existing conditions in the near future. To the *Chinese Hospitals* 46,849 patients were admitted, 47,969 were treated and 12 641 died during 1937. The *Chinese Public Dispensaries* dealt with 264,589 new and 238,527 old cases during the year under review.

Mention has already been made of the fact that owing to exceptional circumstances the public health suffered a set-back during 1937 (see *Public Health* above) and that during the late summer a marked increase in morbidity and mortality experience was noted. As regards the principal diseases responsible for disease and death the notes which follow briefly summarize the more extensive commentaries provided in the Report under review.

A serious outbreak of *cholera* occurred. The disease was first recognized in July though it is significantly observed "notifications of dysentery had already shown a marked increase in June." In July 13 cases were reported, in August 1100 and in September 500 thereafter incidence declined rapidly and only one case was notified in December. Altogether 1690 persons were affected and 1,082 died. Undoubtedly the epidemic was one of the legacies of the disturbed conditions in China—the infection was probably introduced by refugees from South China. Extensive preventive measures were instituted and energetically applied. Over a quarter of a million inoculations were carried out at hospitals, public dispensaries, and at centres staffed by the St. John Ambulance Association and Brigade. Having regard to the inadequacy and faulty organization of the sanitary staff, insanitary methods of night-soil disposal, etc. what is surprising is not the sudden development of the epidemic to alarming proportions, but the success which followed the application of control and preventive measures in a dangerous situation.

Cases of *smallpox* were notified in Hong Kong during every month of 1937 with the sole exception of October. The largest monthly total was recorded in April, though a second and, as it proved more serious peak occurred in December. Altogether 129 cases with 94 deaths were notified during the year. Nearly half a million persons were vaccinated, and in this connexion it may be noted that 21,232 (or 75 per cent.) of the infants registered during the year were vaccinated. The exceptionally high case-mortality rate is suggestive of many missed cases—a more effectively organized sanitary inspectorate would prevent concealment of cases and would lead to the discovery of all contacts.

Though during 1937 *typhus* was rife in many parts of China no case of the disease was reported in Hong Kong. Sporadic cases of *cerebro-spinal* fever occurred throughout the year with March and April the months of maximum prevalence. Notified cases numbered 157 and 88 of the patients died. No case of *plague* was recorded—the systematic trapping of rats and other anti-plague measures continued to be carried out as usual.

Diphtheria was responsible for 308 cases with 148 deaths—maximum incidence occurred in the period November–March. Of the total cases notified 241 were treated in hospitals with 112 deaths. Eight non-fatal cases of *scarlet fever* were notified.

Malaria—The anti-malarial work carried out under the direction of the Malaria Bureau since its establishment in 1930 have succeeded in making malaria a relatively unimportant disease in urban areas. The infection rate still remains high in some rural areas where anti-malarial activities continue to receive vigilant attention. The Report of the Malaria Bureau describes the year's work in detail. To Government Hospitals 677 cases were admitted and 695 treated with 23 deaths, while the corresponding figures for Chinese Hospitals were 1,892, 1,931 and 328 respectively. The distribution of types of

infection among the 695 cases in Government and the 1,931 cases in Chinese Hospitals reads as follows —

Government Chinese Hospitals	Benign Tertian	Quartan	Subtertian	Cachexia	Undefined
	208 298	8 7	309 1 033	121 47	51 503

At the Government Bacteriological Institute 8 917 blood films were examined for the presence of malaria parasites and in 3 581 cases positive findings were recorded. In the Report of the Bacteriological Institute a graph is interleaved showing the percentage relation of the different types of malarial parasites to each other month by month throughout the year and also the rainfall in inches (see also this *Bulletin* 1938 Supp p 217*)

July to October were the months of maximum incidence of fevers of the *enterica* group during the year 464 cases with 176 deaths were reported. Government Hospitals dealt with 84 in-patient cases of typhoid and 6 of paratyphoid with 20 deaths and Chinese Hospitals with 211 cases of typhoid with 108 deaths. At the Bacteriological Institute where 1,539 samples of serum were tested for the specific agglutinins of the enteric bacilli 344 were positive with *Bact typhosum* 6 *Bact paratyphosum A* 3 *Bact paratyphosum B* and 62 type undetermined. The investigation into the presence of agglutinins against typhoid organisms in cases showing no clinical signs of the disease was continued (see this *Bulletin* 1938 Supp p 219*)

Preceding the cholera epidemic a significant rise in the reported cases of dysentery was observed (see above *Cholera*). During the year 576 cases were notified (see below) and according to the Report of the Registrar-General 316 deaths were ascribed to the disease. According to the Hospital returns the majority of the cases were bacillary infections viz —

Government Chinese Hospitals	Amoebic	Bacillary	Undefined	Total	Total deaths
	3 165	117 326	4 237	124 728	16 234

At the Bacteriological Institute where 3 758 faecal specimens were cultured for pathogenic organisms 134 were *Bact dysenteriae* Flexner 11 Shiga and 17 Schmutz infections.

Tuberculosis is responsible for one in every eleven deaths due to all causes. Cases treated in hospitals may be summarized as follows —

	Government Hospitals		Chinese Hospitals	
	Cases	Deaths	Cases	Deaths
Pulmonary tuberculosis	193	61	3 653	1 698
Other forms	122	29	753	292

Overcrowded living conditions and under-nourishment coupled with the exceedingly common habit among the Chinese of spitting in public places combine to spread the disease. Hospitalization of any but a very small proportion of the infectious patients is at present not possible. At the Bacteriological Institute 174 out of 687 specimens of sputum examined were positive with *Mycobacterium tuberculosis*.

The number of patients treated in Government and Chinese Hospitals for various helminthic infections was negligible, totalling 317. Among 101 cases in Government Hospitals were 40 cases of ascariasis and 35 of ankylostomiasis while among 216 cases dealt with in Chinese Hospitals 102 were treated for ascariasis and 44 for ankylostomiasis. Thirty-five patients were treated for clonorchiasis (8 in Government Hospitals). Among 2 407 faecal specimens examined at the Bacteriological Institute 170 contained ascariasis, 104 clonorchis, 42 trichurias, 31 ankylostoma, and 89 were multiple infections.

Little is known so far as this disease is concerned in Hong Kong (see this Bulletin 1937 Supp. p. 209*) and until a systematic survey is carried out the situation as far as this disease is concerned must remain conjectural. The question of obtaining the help of the British Empire Leprosy Relief Association to carry out such a survey is under consideration. Out of 154 specimens of nasal and skin smears examined at the Bacteriological Institute, 50 were positive with *Mycobacterium leprae*.

Venereal diseases.—The facilities for free medical advice and treatment remained as previously described. Details of the year's work at six centres may be summarized as follows:—

Centre	New Cases		Attendances	
	M	F	M	F
Queen's Road (Old Govt. Civil Hospital)	1,241	570	5,838	2,821
Violet Pool Health Centre	1,348	657	7,648	2,575
South Kowloon (Dock)	2,228	481	10,452	2,280
Kowloon Hospital	347	634	1,752	3,201
Taiipo Dispensary	28	2	361	18
Un Long Dispensary	31	8	171	28

In-patients treated at Government Hospitals for syphilis numbered 127 for soft chancres 112 and for gonococcal infections 207. At Chinese Hospitals the corresponding figures were 234, 30 and 82 respectively. At the Bacteriological Institute an interesting comparative study was carried out on the recently described *Ida precipitation test* for syphilis. One thousand sera were tested in parallel with the Kahn test, and the following results recorded:—

	Kahn test	Ida test
Strong positive	214	243
Positive	123	141
Doubtful	44	81
Negative	600	585
Total	1 000	1 000

Kahn tests were applied to 16,581 samples of blood serum 4,345 gave positive 723 doubtful, and 11 513 negative reactions. In addition 617 smears were examined for the presence of the gonococcus, but findings do not appear to have been recorded.

Other Diseases—Under this heading mention should be made of the fact that deaths due to *diseases of the respiratory system* occupied the first place in the list of causes of death and were responsible for 10,350 deaths during the year under review *Beriberi* including the infantile variety constitutes a serious problem and no fewer than 1 681 deaths were ascribed to this cause in 1937 In the Table below the cases and deaths recorded in hospitals for certain respiratory affections and for beriberi are summarized —

Disease	Government Hospitals		Chinese Hospitals	
	Cases	Deaths	Cases	Deaths
Brochitis	248	2	3 634	1 050
Broncho-pneumonia	160	103	2 633	1,890
Pneumonia (Lobar and Un- defined)	102	40	940	517
Beriberi	83	13	2 807	915

Scientific.—The four separate Reports discussed under this title are the following —

(a) *The Report of the Bacteriological Institute* records a further increase in the volume of work dealt with during the year when 42 096 specimens of various kinds were examined and reported upon. Under such headings as *malaria enteric fever dysentery etc* in the preceding notes mention has been made of specific examinations and of findings recorded.

(b) *The Annual Report of the Malaria Bureau* confines itself to discussion of new developments during 1937 This work included the collection and identification of anophelines actual methods employed in anti-malarial work the results of precipitin tests on bloods from mosquitoes caught in various localities and dissections made to discover the presence of malarial infection of anophelines

(c) *The Report of the Analytical Laboratory* describes the nature and volume of the year's work under various headings viz. Official (i.e. Government work) semi-official work for the Naval Military and Air Force Authorities and unofficial work which is concerned with analyses carried out for local firms and private individuals in the Colony

(d) *The Report of the University Clinical Units* comprises the separate Reports of the Professors in charge of the Medical, Surgical and Obstetrical and Gynaecological Units respectively the year's work for each of these units is dealt with in detail.

Financial—Total expenditure on Medical Services—which includes such items as water and drainage works Urban Council cleansing services etc —amounted to \$5 193 816 a sum which formed 16.2 per cent. of the revenue of the Colony from all sources during 1937

P. Granville Edge

REVIEWS AND NOTICES

WEYER (Fritz) [Wissenschaftl. Assistent am Tropeninstitut Hamburg]. Die Malaria Überträger. Eine Zusammenstellung der wichtigen Anopheles-Arten mit Angaben über Verbreitung, Brutgewohnheiten, Lebensweise und praktische Bedeutung. [Vectors of Malaria] Mit Geleitworten von Prof. Dr. P. MUEHLEN und Prof. Dr. E. MARTINI.—141 pp. With 15 figs. 1939. Leipzig: Georg Thieme, Verlag. [Unbound Rm. 8.40 Bound Rm. 9.80.]

The purpose of this work is to provide a concise statement of the facts at present known about those mosquitoes which are concerned in the transmission of malaria in all parts of the world. This was last done by Covell (1928 & 1931) and in recent years not only has knowledge been considerably advanced in many regions, but in some respects notably in the increasing importance ascribed to races or "varieties" within a given species, the point of view has been appreciably modified. Its purpose is very competently achieved. The book begins with an essay of some fifteen pages reviewing, in an interesting style with examples from all countries, the various factors that determine whether a given species is important in a given locality. Then follows a table occupying ten pages in which the malarious regions of the world are set out by continents and the carrier species set out under each country with a few words of comment in each case. Chapter 3 forms the kernel of the book and consists of an alphabetical list of the proved malaria carriers, 46 in number, the distribution, breeding places, behaviour of the adult insect and relation to malaria being summarized. These descriptions vary from one to eight pages in length and contain a vast amount of accurate information with reference to original sources. It is particularly useful that the types of water used for breeding in the different localities are described in some detail. Chapter 4 contains brief accounts of 24 additional species which are of less importance or whose relation to malaria is not fully established. There are no keys for the identification of species. Illustrations are given of some fifteen species, each with a very brief description, but apart from lightening the text these serve little purpose. As a work of reference the book should prove of great value to all students in this field. In a foreword Professor Martini commends the continued study of *Anopheles* to "any people which will leave its homeland and achieve colonial successes on the world's stage."

V. B. Wigglesworth

MARSHALL (J. F.) [C.B.E. M.A. F.R.E.S. Director British Mosquito Control Institute, Hayling Island, Hants.] The British Mosquitoes.—pp. xi+341. With 20 plates & 172 figs. 1938. London: Printed by Order of the Trustees of the British Museum. [One Pound.]

W. D. Lang's "Handbook of British Mosquitoes," which was published in 1920 has been for some time out of print. This volume is a revision of Lang's Handbook, but it incorporates so much new material that it is in effect a new book. The subject is covered in great detail. The book begins with an elementary introduction in which the life history of the mosquito is described, together with the external and internal anatomy at all stages, and a detailed account of

those parts which are used for identification. Then follows an exhaustive and advanced systematic account of the 29 species of mosquito that occur in this country, which makes possible their identification as adults, larvae and in some cases as eggs and pupae. The natural history of each species is fully described and the whole is splendidly illustrated with line drawings, photographs and coloured plates. A short chapter of ten pages is devoted to those methods of control which have been found most practicable in dealing with the mosquito pests of this country, and in a final chapter a number of problems in the biology of mosquitoes, particularly the swarming habits of the various species are discussed. This section contains a brief review on malaria in Britain. The book as a whole will be indispensable to any serious student of mosquitoes in England, whether he is concerned with their systematics or with their control. The *special* sections which form the bulk of the book will not of course concern the worker in the tropics, and *general* questions in mosquito bionomics form only a very small part of the whole.

V. B. Wigglesworth

MANSON BAIJR (Philip) [CMG DSO MD FRCP Senior Physician to the Hospital for Tropical Diseases, London etc.] *The Dysenteric Disorders. The Diagnosis and Treatment of Dysentery, Sprue, Colitis and other Diarrhoeas in General Practice*. With an Appendix by W. John MUGGLETON M.S.M. Technical Assistant—pp. xiv+613. With 9 colour and 14 black & white plates and 106 illustrations in the text. 1939. London Toronto Bombay Melbourne & Sydney: Cassell and Company Ltd. [25s.]

This volume embodies the experience of a life-time spent in the investigation and treatment of disease in persons from the tropics and subtropics, and has been written more especially for those engaged in general and in consultant practice who, from time to time, are confronted with conditions frequently inadequately dealt with in the usual standard works on medicine. The book consists of 522 pages of text matter, included in which are many photographic reproductions, charts and diagrams, and numerous excellent drawings in black and white and in colour, by the hand of the artistically-gifted author. A number of these have already appeared in sundry publications. In addition, there are two appendices, occupying some 40 pages; one of these contains an account of the salient features of the morphology and life history of the parasitic intestinal protozoa of man, while in the other is given an account of certain of the laboratory procedures employed in the investigation of such cases as are referred to in the text.

The first four hundred pages of the work, after a general account of diarrhoea and dysentery and the methods employed in their investigation, are concerned with the epidemiology and geographical distribution, pathology and morbid anatomy, symptomatology, complications and sequelae, diagnosis and treatment of the bacillary, protozoal and helminthic dysenteries and of cholera, sprue and hill diarrhoea, conditions which are more particularly associated nowadays with the tropical zones and therefore of which Dr. Manson-Baird's extensive experience well qualifies him to write. The remainder of the volume is concerned with certain forms of colitis, with the steatorrhoeas and

Transmission

Rats—In the Annual Medical Report for Malta for 1936 (p. 205) it is stated that *R. norvegicus* is the principal rat found and was infected in a recent epidemic. Breeding takes place in heaps of refuse collected for composting into manure.

The Eastern Bureau of the League of Nations (p. 746) consider that transmission by rat immigration for instance in carts carrying rice in India, has not been proved.

SOKHEY and CHITRE (p. 204) found that the percentage of deaths in 80 plague rats from different areas and inoculated with standard doses of plague bacilli was inversely proportional to the human mortality in these areas. The cause of this immunity was not apparently due to a benign epizootic or to hereditary transmission and it is probable that different degrees of susceptibility exist in different races of *R. rattus* and that the susceptibles have died out. TAYLOR (p. 203) shows that plague in India is not now so important as it used to be. This may be due to immunity which has been proved experimentally to exist in the rat population. This immunity is roughly proportional to the prevalence of plague in the areas concerned. The transmission of plague is through house epizootics in *R. rattus*.

GIRARD (p. 207) states that the reservoirs of plague in Madagascar are *R. rattus* and *R. alexandrinus* are the concerned. ROMIC (p. 206) adds *Myomys* to this list and states that sylvatic plague probably does not exist in Madagascar. GILLESPIE *et al.* (p. 753) found that *R. alexandrinus* was the most common rat in the Customs jetty and warehouses in Kobe and on board ships, but in the city *R. norvegicus* is the commonest. They therefore conclude that in the Customs sheds 70 per cent. of rats probably come from ships and 30 per cent. from shore.

NARAYAN (p. 756) considers that the musk rat is a carrier of plague fleas and bacilli and is itself susceptible to plague.

Other Rodents—WASSILIEFF (p. 206) states that all Tunisian rodents are susceptible to varying extents. Fleas probably may transmit plague from man to wild rodents though not commonly in country districts. Sylvatic plague may occur in zones near towns if contact is established between wild and urban rodents. FOURIE (p. 751) in South Africa states that human plague was confined to ports and railways until 1914 when an outbreak of pneumonic plague occurred on an isolated farm. Plague is now endemic, and two groups of rodents are responsible, the gerbille (*Tatera* and *Dromodillus*) and the multimammate mouse (*Alomys corbula*). The latter is incriminated. It occupies infested nests of gerbilles when these have died out and also enters human dwellings. Human outbreaks are therefore limited to the range of these mice but the gerbille is the main reservoir of sylvatic plague. In towns the domestic rats are the danger and there is no direct contact between them and the wild rodents. In towns therefore rat harbourages should be eliminated rather than measures taken against wild rodents. The Annual Medical Report for Basutoland for 1936 (p. 748) shows that an epizootic in gerbilles was associated with a small human epidemic.

PHILANG (p. 754) thinks that the considerable mortality found in cats kept in Cambodia to check the invasion of houses by rats was probably due to feline plague.

PUBLIC HEALTH REPORTS Washington (p 210) states that the first positive evidence of plague in wild rodents of Washington State was found by the mass inoculation of fleas and lice from *Citellus townsendi*. Furthermore fleas ticks and lice stored in the icebox produce typical plague when injected into guinea-pigs after 10 months.

MEYER (p 201) in the United States warns against contact with wild rodents especially by handling sick or dead rodents—squirrels marmots, chipmunks and prairie dogs. These Sciuridae and certain mouse and rat species have spontaneous plague. He gives the mode of diagnosis by the large-pool flea method. CUMMINGS (p 753) records 5 human cases of plague in the U.S.A. in 1937 and 105 in the rodents mentioned by MEYER.

The Surgeon General of the United States of America (p 746) reports that seven species of ground squirrels have now been found to harbour plague including *Citellus beecheyi fisheri*, *C. grammurus* and *C. townsendi*. The tree squirrel and the rodents mentioned by MEYER also contract infection.

In the Argentine DE LA BARRERA (p 211) reports that two main types of rodents are concerned in epizootics of sylvatic plague cuis (including the genera *Cavia*, *Galea* and *Microcavia*) and *Graomys griseoflavus*. These are not domestic in their habits their fleas are not of common kinds and little is known about them. A connexion was established between a small epidemic of human plague and a severe epizootic in *Graomys griseoflavus* which had been found in human dwellings under the stress of hunger. It is not however possible to say what is the degree of danger to man.

DE ARAUJO (p 210) states that cats are susceptible to *P. pestis* by scarification or inoculation but not by feeding in the absence of trauma of the mouth or the intestinal mucosa.

Fleas—SAUTET (p 755) discusses the factors determining proliferation or destruction of fleas including seasonal changes humidity nourishment and temperature. Fleas completely blocked die those incompletely blocked may live for a long time and are dangerous, those not blocked are not a source of much danger.

In Malta (p 205) the mouse flea *Leptopsylla musculi* and *X. cheopis* are more common than *Nosopsyllus fasciatus*.

ADVIER (p 210) investigated *Synosternus pallidus*, a common flea of Senegal which however has little opportunity to ingest plague bacilli and even if it does so it does not appear to be very capable of transmitting the disease. FOURIE (p 751) thinks that the primary epizootics in South Africa are apparently spread by *Dinopsyllus hypus*, *X. eridos* and *Chastopsylla rossi*. *X. brasiliensis* found in the multimammate mouse probably spreads plague to man.

GIRARD (p 207) in the Madagascar highlands found that *X. cheopis* remains infective for several weeks after rats have disappeared and thereafter will feed on man. In this way plague may be transmitted for considerable distances by the transport of fleas. Fleas in paddy rice dust of huts may have to obtain their first blood meal from man. If man has the septicaemic form fleas may thus infect local rats and this forms the basis of the reversal of the usual cycle into a cycle man-flea-rat. SOREL (p 206) and ROIC (p 209) state that in Madagascar *X. cheopis* is the important transmitting flea. It is also the principal flea in India, though *X. brasiliensis* according to TAYLOR (p 203) may be

important in the Deccan. *X. asia* is negligible. This author discusses the effect of climatic factors on fleas.

OURTOMO *et al.* (p. 753) found that the flea counts in the Customs sheds at Kobe were 75-82 per cent. *X. cheopis* and 21-07 per cent. *N. fasciatus*. The *cheopis* index of 4.2 deserves serious attention. Counts in Tokyo were only 0-01 *X. cheopis* and in Kobe city 5.73.

ESKOEY (p. 754) in the United States tested the ease with which fleas, rats, and rodents contracted infection and their relative powers of transmission. *X. cheopis* was the most easily infected flea, less so were *N. fasciatus* from rats, *Diomus mordax* and *Hoplopyllus anomalus* from ground squirrels. Transmission by *X. cheopis* was much more effective than by the others. Infected fleas which do not show blockage of the proventriculus do not seem to be infective bite and the bites of most infected fleas are infective for a short time only probably 1 to 2 days, but fleas may be infected and live months, except *X. cheopis* the average life of which was 16 days. Therefore it is possible that infection may be carried through months when the rodents are hibernating. When the plague bacillus is established in the gastro-intestinal tract of the flea it continues to exist until the death of the flea. Parasites concerned in sylvatic epizootics are rather inefficient compared with those of the rat and human infections.

SASSOVICH and TICHOMIROVA (p. 215) found that plague bacilli could be isolated after 6-10 days in larvae and nymphs of the tick *Dermacentor submarginatus* fed on infected guinea-pigs, but that the bacilli could not be transmitted from the larva stage to the nymph stage.

MERTENS (p. 755) found that *Triatoma rubrofasciata* cannot transmit plague by bite directly except immediately after an interrupted meal on an infected animal. As it may harbour plague bacilli for at least a month however it may be dangerous to man if crushed on the skin and the bacilli rubbed into the bite.

Clinical etc

FIMAYER (p. 212) reports a patient with a submaxillary bubo in an epidemic of pulmonary plague. Entrance was probably through the conjunctiva or the upper air passages. MEYER *et al.* (p. 212) report the case of a boy of 10 from a ranch in a sylvatic plague area, with an axillary bubo proved to contain *P. pestis* and meningeal symptoms which relapsed. Plague encephalitis and meningitis were found post mortem. They consider that recent cases of plague from the western States reflect the behaviour of an agent which causes mild infections with a tendency to latency.

In the Annual Report for Baurtoand (p. 748) it is noted that in an outbreak blood culture revealed *P. pestis* although there were no glandular enlargements.

In Madagascar GIRAUD (p. 206) states that 85 per cent of plague cases are only recognised after death, and that diagnosis is by lung and liver puncture. In Java ROSIER (p. 748) uses spleen puncture for post mortem diagnosis.

KAMAL (p. 752) describes the functions of "Health Agents" in Egypt who are responsible for certification of deaths. If acute disease is suspected they are required to puncture heart, apex and base of lungs and liver of cadavers to obtain material for cultures and smear and to fill capillary tubes for despatch to laboratories.

Treatment

NORMAN WALKER (p 213) finds that treatment by serum from human convalescents from plague in whom syphilis tuberculosis and malaria are excluded, in doses of 20 cc. on 3 consecutive days usually brings the temperature to normal. A mortality of 16.7 per cent. was found in 48 patients thus treated against 47.9 per cent. in 48 untreated. Arrangements are being made to store the serum. SOREL (p 207) uses specific treatment by serum and bacteriophage but results with the latter intravenously subcutaneously or into the bubo do not greatly differ from the results obtained by serum alone.

CARMAN (p 757) in East Africa found that 3 of 6 patients recovered with intramuscular prontosil (5 cc. or 2½ cc. twice daily) whereas all the previous nine (who had not been treated with prontosil) had died.

Prevention

In Malta (p 205) a systematic anti-rat campaign is advocated together with a proper service for collection and disposal of all refuse. In Egypt KAMAL (p 752) shows how great are the opportunities for rat nesting in matting roofs of houses. Nothing short of demolition and the building of rat proof houses will keep plague away.

ROSIER (p 748) shows that a reduction in the plague epidemic in Java has taken place along with the continued house improvement campaign. [For the effect of this campaign on the malaria position reference should be made to ROSIER this *Bulletin* 1938 Vol. 35 p 417 and GROOTINGS *ibid* p 902]. Altogether 1 383 363 houses have so far been improved.

TAYLOR (p 204) in India states that the construction of rat proof grain stores in towns is the only permanent measure taken. Temporary measures include (1) vaccination (2) evacuation (3) rat destruction (4) disinfection (5) control of grain traffic. Vaccine has been improved and field trials will be made and evaluated. In rat destruction trapping is of limited value. Poison baiting is easier with pills of 3 grains of barium carbonate in a paste of flour freshly made daily. Cyanide gas fumigation is increasingly popular. The same points are brought out in the Annual Report of the Eastern Bureau of the League of Nations (p 746) which also mentions general sanitation isolation and treatment of patients regular collection and examination of fleas and anti-plague propaganda.

CAMPBELL (p. 750) describes the routine adopted for plague workers on entering infected houses in Mwanza. The workers enter behind an anti-flea barrage of spray and their arms and legs are sprayed. Anti-rat measures are most effective if carried out in the plague off-season because this kills off the rat-cause of carry-over to the next season. The author does not consider carry-over by infected blocked fleas or bacilli in dust or fomites to be important.

GILLES (p 213 and 214) gives the technique of the fumigation of the cargoes of lighters with liquid HCN which is effective and not dangerous if reasonable care is exercised. The abstract cannot be summarized further.

SCOTT (p. 201) states that rodent destruction on the Witwatersrand is carried out by (1) gassing burrows near dwellings and farms (2) poisoned grain in open areas (3) traps on premises where foodstuffs are stored. These measures have been successful. In Basutoland (p 749) the campaign against gerbilles was started by baiting every burrow in an area 150 miles long by 6 to 10 miles wide. This was

successful and the gerbilles were practically wiped out. The work, however needs to be continued.

For pulmonary plague SORZL (p. 207) and ROWIC (p. 209) in Madagascar consider that the only effective method of prevention is to isolate all those exposed to infection. Masks and spectacles must be worn and regular inspection made of these contacts to ensure early diagnosis. GIRARD (p. 208) states that isolation for 10 days is necessary since the incubation period may be up to 9 days. These procedures are efficacious.

ALBEROZ (p. 747) studied the occurrence of plague in Rosario (Argentina) since its introduction in 1899. From 1900 to 1937 there were 703 cases of human plague in Rosario with a mean mortality of 35.27 per cent. Only in the last 8 years have measures been highly satisfactory when disinfection and vaccination gave place to active deratization. From 1930 to 1937 only 14 cases have been reported. FONTENELLE (p. 758) shows that during 1929-1936 plague disappeared completely from Rio de Janeiro with continuation of building improvement and active rat destruction. ALFARO (p. 747) states that anti-plague measures in the Argentine although difficult to carry out have been followed by a noteworthy decrease of plague and the figures of cases have fallen from 1,178 in 1919 to 31 in 1936.

Vaccination—REITANO (p. 215) states that not every avirulent living strain of *P. pestis* possesses immunizing power and found that desiccated *P. pestis* (from which cultures could be obtained up to 30 months) showed no immunizing power and was therefore useless as a vaccine. PIRIE and GRASSET (p. 757) in experimental work show the superiority of living over killed vaccine. Similarly serum prepared from animals inoculated with living vaccine was capable of saving the lives of 2 of 6 infected animals treated with it but six others treated with serum prepared from animals vaccinated with dead bacilli all died. SORZL (p. 207) states that the live vaccine of avirulent E. V. strain used in Madagascar is preferred to a dead vaccine, and GIRARD (p. 208) and ROWIC (p. 209) also mention E. V. and show that the mortality figures have fallen since its introduction. OTTEN (p. 757) is convinced that the only successful vaccine must be a living one prepared from avirulent strains of high antigenic potency and quotes figures of an alternate-case field trial he made the results of which show the value of his vaccine in a striking manner. In the preparation of a vaccine it is essential that antigenic potency must be preserved, and he advises deep-stab culture at 4-6°C. for producing variants which lose virulence without impairing immunizing properties. ROSTER (p. 748) reports that this live avirulent vaccine of OTTEN has been used in the affected areas of Java on 2,363,642 individuals. Excellent results were obtained, and the present decline of the epidemic is attributed chiefly to this prophylactic measure.

CAMPBELL (p. 750) found that mass inoculation [presumably with dead vaccines] did not seem to have any effect in stopping the Mwanza outbreak, modifying the illness or reducing the chances of acquiring infection. It did, however allay panic.

On the other hand the report of the Haffkine Institute (p. 200) discusses vaccines of dead bacilli with the following conclusions: (1) Broth vaccines incubated at 27°C. are more potent than those incubated at 37°C. (2) The reverse is the case with agar grown vaccines probably owing to the larger organisms produced at 37°C. (3) Broth-grown heat-killed vaccines from virulent cultures at 27°C.

are superior to live avirulent vaccines grown at either 27°C or 37°C. (4) In broth vaccines heat-killed vaccine incubated at 27°C. is the most potent live avirulent vaccine grown at 37°C. the least potent. In agar vaccine from the same strains live avirulent vaccines incubated at 37°C. were the most potent and heat killed vaccines incubated at 27°C. the least. (5) The method of killing the vaccine grown at 37°C. does not seem to matter but in those grown at 27°C killing at 55°C. for 15 minutes gives a much more potent vaccine than at 60°C. for one hour (6) Stored at 4°C. heat killed vaccines show no measurable loss of potency for months Live avirulent vaccines on the other hand deteriorate so rapidly that it would be impossible to issue them from a central laboratory for effective use in so large a country as India.

C II

LEPROSY

PRÉCIS OF ABSTRACTS IN THIS SECTION

MUIR (p 531) advises the appointment of a whole time leprosy expert for East Africa and commends the voluntary system to attract patients without compulsion

TOLENTINO (p 531) considers resistance to be a dominant and susceptibility a recessive character and that they are transmitted in Mendelian fashion HAYASHI (p 531) thinks that a shift of incidence to the later years of life is an indication of a decline of the disease, as in Norway

JOSEPH (p. 532) finds that hot humid climates are favourable and high altitudes with low vapour tension unfavourable to the spread of leprosy in India. Poverty and various customs play a part. OBERDORFFER (p 532) shows that the highest incidence in Ceylon is round Colombo and other towns of the south west and east.

PIÑERO GARCIA (p 532) states that incidence in Rosario has risen from 1 to 2.5 per 10 000 in the decade 1927-37

MACNAUGHTON (p 532) describes leprosy in Fiji Intramuscular iodized chaulmoogra oil is the usual treatment

STRACHAN (p 533) states that 61 per cent. of early untreated NI cases appear to have undergone spontaneous arrest in Basutoland.

DOULL (p 533) shows that the maximum attack rate (of 4.1 per 1 000) occurs between the ages of 10 and 14 at Cebu in the Philippines and that the annual risk of contracting infection is about 5 times as high in persons with house contact as in the ordinary population. At Cullon LARA (p 533) observed that in child contacts areas of skin which are most frequently in contact with parents—arms legs and buttocks—are usually first found to be infected In some instances the first lesions were small weal like or papular spots usually bacteriologically positive

LOWE and CHATTERJI (p 534) think that leprosy lesions arising at the site of scarification or tattooing may originate from contamination of the instruments but that more commonly a leprosy infection is latent at the time of the injury

LEITNER (p 534) discusses the bone lesions in leprosy

CASSIANO (p 535) shows that the leprosy reaction though occasionally closely simulating true erysipelas differs from it in that it occurs only

where there are cutaneous lesions of leprosy and is mild not infective and not associated with a streptococcus. GUILLAUMOU (p 535) reports the leprosy reaction following Jennerian vaccination in 11 patients.

DEGOTTE (p. 535) and DUBOTS and DEGOTTE (p 535) found that if Tr. Iodi is applied to lesions, allowed to dry and then covered with starch powder sweating either from muscular exercise or pilocarpine injection will produce a blue colour. This test they found to be valuable in suspected cases, lack of power to sweat being shown in 42.26 per cent.

RADMA (p. 536) states that gland puncture showed acid fast bacilli in 24.5 per cent. of a series of lepers and in 4.6 per cent. of non-lepers, but in 2 of the latter 5 positives the bacilli were atypical and easily distinguished from *Mycob. leprae*. VAN BREUSEGHEM (p 536) found leprosy bacilli in 20 per cent. of treated and 40 per cent. of untreated cases by examining mucus from both nostrils. NAIR and PANDALAI (p. 536) found acid-fast bacilli in the lesions of 57.27 per cent. of 147 neural cases. [See also DES ESSARTS below.]

RADMA (p 536) shows that blood lipase is low in severe leprosy and increases as patients improve under treatment. SPEIGHT (p 537) found the blood sedimentation rate to be a good index of prognosis if the influence of intercurrent disease is excluded.

GREVAL *et al* (p 537) found the complement fixation test with the Witebsky-Klingenstein and Kuhn antigen, to be sensitive in the nodular type but less so in the nerve type. The test is not specific. ROW (p 537) obtained a strong reaction in all cutaneous cases with a complement fixation reaction employing a preparation made by prolonged autolysis of tubercle bacilli. FICKER (p. 537) uses an antigen prepared from cultures of acid fast bacilli in a flocculation reaction which he reports to be positive in a larger proportion of nerve cases than is usual with similar tests and (p. 538) uses Calmetestrol for strengthening weak complement fixation reactions.

CAPPELLI (p 538) found that the Pallida reaction is negative with the sera of non-syphilitic lepers.

BURNET (p 538) finds the leprolin reaction to be positive in nerve cases and a large proportion of contacts but negative in cutaneous leprosy and infancy. Its significance is not understood.

ROUSSEAU and GAUGEAT (p 539) claim to have cultivated *Mycob. leprae* from a leproma in a fluid *Aspergillus* medium. MANALANG (p 539) reports increase in the proportion of non-acid fast forms of leprosy bacilli (believed to be degenerated) in lesions treated with *H. erythraea* preparations. He also (p 539) found the Cullon Mercado preparation to be the most effective in causing the disappearance of *Mycob. leprae* from gland tissue kept in test tubes, but *erythraea* oil and others the most effective in removing acid-fastness.

BURNET (p 539) records the successful infection of one of a series of hamsters with human leprosy. The spleen had not been removed.

MARCHOUX and CHORINEZ (p 540) consider that the smallest lesions of the skin permit the entry of leprosy bacilli, which can also penetrate healthy mucous membranes. The bacilli are spread by leucocytes. DES ESSARTS (p 540) believes that leprosy bacilli may be eliminated from the skin of patients with so-called closed leprosy and that these patients may therefore be a danger to others. JEREMIAH and BARTHOLOMEWS (p 540) also consider that patients with neural leprosy are potentially infective and should be segregated. C II

LEPROSY REVIEW 1939 Jan Vol 10 No. 1 pp 1-102. With numerous illustrations.—*East African Number*

This important issue contains reports by Dr E. Muir on his 1938 tour in East Africa. The recommendations based on the conditions found necessarily contain much repetition but the following points are of especial importance although most of the information is of local interest.

He confirms the high incidence of leprosy in the north-east of the Belgian Congo and extending to Uganda and the Equatorial Province of the Sudan. In the Kenya uplands it is less prevalent than on the coast and in Tanganyika. The severity however does not correspond with the incidence, this he attributes to the widespread infection involving even those with higher degrees of natural resistance who develop a mild form. In the Congo extensive surveys are being made by the Belgian Croix Rouge and in British Territories much anti-leprosy work is carried out by missionary bodies with funds chiefly supplied by Government or Native Administrations.

His main recommendations are firstly the supply of a whole-time expert to tour round the leprosy institutions giving advice on the best preventive measures and on treatment. Next he supports the voluntary system to attract the patients and he notes that compulsion is nearly everywhere being done away with in our possessions. Out-patients clinics may be of value where the patients are well-nourished and when the patients can be followed up to their homes and contacts examined. The abandonment of compulsion in Zanzibar resulted in an improved morale and no diminution of numbers. As usual occupation therapy is stressed as well as education of the patients. In addition to East Africa Malta and Aden are reported on.

L. Rogers

TOLENTINO (Jose G.) The Role of Heredity in the Transmission of Leprosy.—*Monthly Bull. Bureau of Health* Manila. 1938. June. Vol 18. No 6 pp 261-272. [12 refs.]

This paper discusses the rôle of heredity in the transmission of leprosy on the lines of Mendel's law. The author considers that resistance and susceptibility may be transmitted to the offspring to a great extent according to that law. Resistance appears to be the dominant and susceptibility the recessive characteristic. The resistant persons are immune under any conditions of exposure to infection but a slight amount may infect a susceptible one. Not all the children of lepers are susceptible and adult infections are possible. He concludes that susceptibility and resistance to leprosy are very likely hereditary.

L. R.

HAYASHI (Fumio) The Age Distribution Curve in Leprosy.—*Internal J. Leprosy* Manila. 1938. Oct.-Dec. Vol. 6. No 4 pp 491-496. With 9 figs.

The data for four censuses in Japan are analysed. In leprosaria cases the age distribution is low and approaches the curve of the age of onset. A shifting of the age curve to a later period indicates a late stage or a decline of the disease as illustrated by Norway. The

fact that the number of lepers found at the censuses does not decrease proportionately to those among military conscripts is partly explained by a rise in the age of the curve for the whole country

L. R.

JOSEPH (J. J.) Factors influencing the Incidence of Leprosy in the Madras Presidency—*Leprosy in India* 1939 Jan. Vol. 11 No 1 pp 3-13. With 1 map

The author discusses the incidence of leprosy on the basis of records of over 400 leprosy clinics at which within nine years some 200 000 cases have been recorded. The census returns from 1871 to 1921 showed almost stationary figures among an increasing population, but in the decade to 1931 the population increased 10 per cent. and the leprosy figures 100 per cent. due to increased interest in the disease. A map shows the chief foci of infection in the north-east coastal and the southern central areas. This confirms the higher incidence in hot humid climates. High altitude and low vapour tension are unfavourable to the spread of leprosy. Caste and marriage customs help to spread the disease. In schools and colleges the highest incidence is among those below the age of 12 years. The poor depressed classes who live under bad sanitary conditions, have a high incidence.

L. R.

OBERDORFFER (Manfred) Moderne Leprabekämpfung in Ceylon. [Leprosy in Ceylon.]—*Arch f Schiff- u Trop Hyg* 1938. Dec Vol. 42. No 12 pp 550-552 With 1 fig (map)

This brief paper illustrates by a map the incidence of leprosy in Ceylon. It brings out the high incidence in the south-western part of island and a smaller area on the east coast. The highest rates run 5 to over 10 per 10 000 population were met with around the cities of Colombo and Galle and those of the east coast.

L. R.

REO GARCIA (Pedro P.) Endemiografía de la lepra en Rosario [Leprosy in Rosario.]—*Revista Méd Argentina* 1938 Nov 30 Vol 25 No 48 pp 2233-2247 With 6 diagrams [16 refs.]

There are many Rosarios but the one referred to here seems to be Córdoba, Argentine Republic.] The article gives a good deal of information but mainly of local interest and to a great extent dealing with the history of the disease and its spread during the past decade. In 1927 there were 1 111 known lepers in the Argentine, when the population was 10 639,338 or 1 per 10 000. Since then the rise has been unchecked till in 1937 the number was 3,288 among a population of 12,781 611 or 2.5 per 10 000. Details of the 1928-29 census of lepers are given, stating the nationality, age, sex, place of residence and type of disease. The mortality during the decade is presented in a series of graphs. Doubtless there are other patients who have escaped notification.

H. H. S.

MACNAUGHTON (W. G.) Report on Central Leper Hospital, Makogai. —*Fiji Ann Med & Health Rep for Year 1937* pp 41-44

At the end of 1937 577 patients were accommodated in the Fiji leper institution, of which this is the annual report. Cases are being

received in an earlier stage than formerly especially in Fijians and the majority are cutaneous ones chiefly among the Indians. Iodized chaulmoogra oil intramuscularly is the usual and the most painless treatment. Methylene blue on the whole has not been followed by marked improvement. Among 560 treated patients 161 became arrested or quiescent for from six months to two years and 233 more were improved. Of the 161 the neural type formed 70 per cent. About four and a half gallons of chaulmoogra oil were produced from trees grown on the island. Work is provided and about \$1 000 worth of produce was purchased from the patients. The settlement is a credit to Fiji.

L. R

INNES (James Ross) A Leprosy Survey in the Island of Malaita, British Solomon Islands.—*Internat. Jl Leprosy* Manila 1938 Oct-Dec. Vol. 6 No 4 pp 501-513 With 3 figs. (2 maps)

This is a fuller account of the work recorded in *Leprosy Review* [see this *Bulletin* 1938 Vol. 35 p 882]

L. R

STRACHAN (P D) Statistical Evidence Indicating the Predominance of Abortive or Stationary Leprosy in Basutoland.—*Internat. Jl Leprosy* Manila 1938 Oct-Dec Vol 6 No 4 pp 497-499

This paper reports the results of further surveys in Basutoland and shows the existence of a large number of abortive cases. Statistics are given to indicate that a large number of early neural cases tend either to remain stationary or to abort. During ten years 61 per cent of early untreated NI cases appeared to undergo spontaneous arrest.

L. R

DOLL (James A) The Importance of Field Studies of Leprosy with Especial Reference to the Risk of Household Exposure.—*Amer. Jl Hyg* 1939 Jan. Vol. 29 No 1 Sect A pp 27-33

This is an interesting account of field studies of leprosy at Cebu in the Philippines. The results are most clearly expressed as attack rates per unit (usually 1 000) of person-years of experience—that is, the number of cases per 1 000 persons observed for one year. The records deal with 8 007 individuals of 1 051 families. Living in a house with a leper for one month constitutes exposure to infection. The attack rates averaged 1.3 per 1 000 person years with a maximum of 4.1 between 10 and 14 years of age and falling to 0.2 at over 50 years. The annual risk of contracting the disease is about five times as high with as without house exposure the figures being 5.1 to 0.9. The highest rate of 14.8 to 2.1 was again from 10 to 14 years of age. The rate among exposed persons was 5.0 in males and 4.1 in females. No account was taken of the duration of house contact with a leprosy patient or of the type of the cases.

L. R

LARA (C B) Early Leprosy in Children of Lepers, Further Observations on the Early, Definitely Identifiable Leprotic Lesions.—*Monthly Bull. Bureau of Health* Manila 1938 July, Vol. 18 No 7 pp 325-355 With 5 figs.

This paper deals with further work in watching for the earliest stages of leprosy in children of lepers under close observation at the

advocates the application to the lesions of a coating of Tr Iodil and after it has dried starch is sprinkled over it. On provoking sweating by muscular exercise (or according to Dubois by the injection of pilocarpine) the starch is turned blue only in the areas where sweating occurs. Its absence indicates the positive reaction of loss of the power to perspire. Positive results were obtained in 60-67 per cent of 196 definite but not very advanced, cases of leprosy. In suspected cases the rate was 42.28 per cent and in slightly suspicious ones 21.05 per cent. These figures are in agreement with VAN BREUSEGHEM's 71 per cent of reactions with the test. He therefore considers this test of JURGENSEN and MILNOR to be of some value in suspected cases of leprosy.

11 This paper records very similar results with the use of pilocarpine in place of muscular exercise to produce sweating. The author obtained 72 per cent of reactions in simple neural lesions, 88 per cent in tuberculous ones, and 79 per cent in 100 total cases. [See also *il. Bulletin* 1934 Vol. 31 p 554] L. R.

RADWA (R) La ponction ganglionnaire de sujets sains en pays d'endémie lépreuse. [Gland Puncture in Healthy Persons in Endemic Leprosy Areas.]—*Ann. Soc. Belge de Méd. Trop.* 1938, Sept. 30 Vol. 18, No. 3 pp. 497-500.

The author reports on examinations of 135 lepers and 102 non-lepers for lepra bacilli by means of gland puncture. The former yielded 24.5 per cent of positive results. The latter only 4.8 per cent, but in two of the five positive ones the acid-fast bacilli were atypical and easily distinguished from that of Hansen. L. R.

VAN BREUSEGHEM (R) Contribution au diagnostic de la lèpre. L'examen du mucus nasal [Diagnosis by Examination of Nasal Mucus.]—*Ann. Soc. Belge de Méd. Trop.* 1938, June 30 Vol. 18, No. 2 pp. 291-292.

The author records that he found lepra bacilli by examination of the nasal mucus from both nostrils in 20 per cent. of treated cases of leprosy but in 40 per cent of untreated cases. They were found on both sides in 30 per cent only of the positive cases, so both should be examined. L. R.

NAIR (V. Govindan) & PANDALAI (N. G.) A Note on the Importance of a Thorough Bacteriological Examination of All Cases of Clinical Leprosy.—*Jl. Indian Med. Assoc.* 1938, Nov. Vol. 8, No. 2, pp. 86-90 [12 refs.]

These authors report finding acid fast bacilli in the lesions of 57.27 per cent of 147 neural cases of leprosy. They stress the importance of such examinations in all forms of the disease. L. R.

RADWA (R) Sur la lipase du sérum des lépreux. [Lipase of Serum in Leprosy.]—*Ann. Soc. Belge de Méd. Trop.* 1938, June 30 Vol. 18, No. 2 pp. 233-236. [11 refs.]

The author refers to the work of ROGERS, confirmed by MUIR, showing a decrease in blood lipase in severe cases of leprosy and an increase

in cases improving under chaulmoogra treatment. He goes on to record his own observations confirming the earlier work. Details of repeated estimations in fourteen cases show a serious decrease in lipase in severe cases as compared with that in cases doing well. In those improving under alepol treatment a notable increase in the lipase in the blood was observed. L. R.

SPEIGHT (A.) Erythrocyte Sedimentation Test and Prognosis in Leprosy.—*Trans Roy Soc Trop Med & Hyg* 1939 Jan 28 Vol 32. No 4 pp 505-509 With 3 graphs.

The author has made regular monthly estimates of the erythrocyte sedimentation curve in cases of leprosy as advised by MURR, and divides them into three types. The prognosis is favourable when the index remains at a low point throughout not exceeding 25 and also when a high initial rate shows a progressive fall under the influence of treatment. On the other hand the outlook is unfavourable when a high index does not decline with treatment. Intercurrent disease and other depressing influences may increase the rate and should also be taken into account in making a prognosis. L. R.

GREVAL (S. D. S.) LOWE (John) & BOST (R.) Complement-Fixation in Leprosy with Witebsky, Klingenstein and Kuhn (W.K.K.) Antigen a New Technique.—*Indian J Med Res* 1939 Jan Vol 26. No 3. pp 843-849

Complement fixation tests have been carried out on leprosy cases with the Witebsky Klingenstein and Kuhn antigen with the technique of the Wassermann test. A high order of sensitiveness was found in the lepromatous type but a low order in the nerve type. The specificity of the test is not of a very high order and positive reactions have been obtained in kala azar and doubtful ones in malaria, syphilis and tuberculosis. The diagnostic value is only considerable in the lepromatous type. L. R.

ROW (R.) Some Experimental Observations on Human and Rat Leprosy and their Significance in the Pathogenesis and Treatment of the Disease.—*Trans Roy Soc Trop Med & Hyg* 1939 Jan. 28. Vol 32. No 4 pp 497-504 With 2 plates. [12 refs.]

Complement fixation tests were carried out in over one hundred leprosy cases with a preparation made by prolonged autolysis of tubercle bacilli. A strong reaction was obtained in all cutaneous cases and negative ones in nerve cases showing no lepra bacilli. In tuberculoid cases the reaction was doubtful. L. R.

FICKER (Martin) Eine neue Flockungsreaktion bei Lepra [A New Flocculation Reaction in Leprosy].—*Ztschr f Immunitätsf u Experim Therap* 1938. Nov 8 Vol 94 No 3/4 pp 357-362.

The author describes yet another form of antigen for a flocculation reaction in leprosy. It is prepared from cultures of the acid fast bacillus 1225 or L3 Troc by an elaborate method for which the original paper should be consulted. Flocculation with it is reported to give negative reactions in syphilis, but positive ones in leprosy. It is also said to give a larger proportion of positive results in cases of nerve

leprosy than are obtainable by any previous such test, and in a series of cases it gave positive reactions when examinations of the nasal mucus were negative.

L. R.

FICKER (Martin) Ueber Verstärkung von Antigenen für die Komplementbindung bei Lepra. [Antigens for Leprosy Complement Fixation Tests.]—*Zucker f. Immunitätsf u. Experim. Therap* 1938 Nov 8. Vol. 94 No. 3/4 pp. 363-368.

In this brief note the author reports that weak and doubtful complement fixation reactions in leprosy may be strengthened by the addition of Bayer's Calmestrol.

L. R.

CAPPELLI (E.) La "Pallidareazione" di Gaehtgens sui sieri lebbrosi. Contributo allo studio dell'essenza della R. Wassermann. [The "Pallida Reaction" in Sera of Lepers.]—*Giorn. di Batteriol e Immunol* 1939 Mar Vol. 22, No 3 pp. 425-436. [18 refs.] English summary [Summary appears also in *Bulletin of Hygiene*]

The pallidareaction practised on leprosy sera with the technic suggested by Gaehtgens and with the spirochaetic antigen created by him allows us to conclude —

(1) that the specificity of the reaction is confirmed by the total absence of positive results (+++) on the sera of non-leptic lepers

" (2) that, as the Pallidareaction was positive (+++) only in one case, which concerned the one leper shown to be affected with lues, this fact, if proved by further researches, offers the possibility of revealing positive specific reactions for lues in lepers

(3) that the humoral reactions which can be observed in sera of lepers by means of antigens consisting of extracts of sound organs and of organs of hereditary leptic individuals (positive Wassermann reaction)—even

VAN BREUSEGHEM (R.) showing the existence of specific leprosy apart from the possibility of aspecific reactions — antitoxins—may be compared to those of leptic sera only in the aspecific component with regard to the fact that this reaction remains negative toward an antigen formed only by *Treponema pallidum*.

BURKET (Et.) La réaction à la Léproline chez un groupe lépreux en Tunisie. [Leprolin Reactions.]—*Arch. Inst. Pasteur de Tunis* 1938 Dec. Vol. 27 No. 4 pp. 341-359

Leprolin reactions in cases in Tunis are recorded which are in close agreement with those of previous observers. The reaction is negative in infancy and in cutaneous cases of leprosy. It is positive in nerve cases, and in large proportion of contacts, especially those of the later ages. It is not certain if the reaction is a measure of immunity or an allergic phenomenon.

L. R.

COWDERY (E. V.) Cytology of Leprosy.—*Puerto Rico Jl of Public Health & Trop Med* 1938 Dec. Vol. 14. No 2. pp 85-117 [34 refs.] [Spanish version pp 118-123.]

This paper largely consists of a theoretical consideration of the nature of the causative organism of leprosy and its morphological variations. It should be read in the original by those interested.

L. R.

ROUSSEAU (Paul) & GAUGEAT (M) Culture du bacille de Hansen—a partir du léproma—(suivant la méthode de VAUDREMER et Mlle BRUN) [Cultivation of Hansen's Bacillus].—*Rev Méd et Hyg Trop* 1938 Sept.-Oct. Vol. 30 No 5 pp 268-270

These authors claim to have cultivated Hansen's bacillus by immersing portions of lepromata free from skin in a fluid *Aspergillus* medium. They describe a cycle of development commencing with a granular cyanophile stage and reaching an acid-fast condition. L. R.

MANALANG (J) Non-Acid-Fast Forms of *M. leprae* in Leprotic Lesions. Second Report.—*Jl Philippine Islands Med Assoc* 1938 Oct Vol. 18, No 10 pp 617-626. With 4 charts.

Four lepromatous patients with symmetrical lesions on the back were injected on one side intradermally with *H. wrightiana* preparations for from fourteen to seventeen weeks and the effect on the lepra bacilli noted from time to time. In three there was a definite increase in the proportion of non-acid fast organisms. In the fourth case abscesses and ulcerations explained the absence of such changes. One patient with repeated mild lepra reactions during the experiment also showed markedly increased non acid fasts in the untreated control lesions. The author considers the non-acid fast forms to be bacilli degenerating as the result of the action of the drugs. L. R.

MANALANG (J) Comparative Effects of Different Chaulmoogra Preparations on *M. leprae* in vitro.—*Monthly Bull Bureau of Health Manila* 1938, Sept Vol. 18 No 9 pp 451-460

Experiments to ascertain the effects of the prolonged action of chaulmoogra preparations on acid fast bacilli in glands removed at autopsies and kept in test tubes are recorded. The numerical diminution or staining alterations of the bacilli were noted each month. The Cullion Mercado preparation was most effective in causing the disappearance of the *M. leprae* from the glands and *wrightiana* oil and esters in removing acid fastness. These observations seem to agree with DE VERA's clinical trials of similar preparations. L. R.

BURNET (Et) Inoculation positive de la lèpre humaine au hamster inoculation négative à divers autres rongeurs. [Successful Inoculation of Human Leprosy Material in the Hamster Failure in Other Rodents].—*Arch Inst Pasteur de Tunis* 1938, Dec Vol 27 No 4 pp 327-340 With 8 coloured figs. on 1 plate.

This paper records the successful infection of a hamster by the insertion under the skin of a small piece of a human leproma. In less than a year a subcutaneous lesion, containing numerous acid fast bacilli developed as shown by coloured illustrations. This confirms ADLER's success in 1933 [this *Bulletin* 1933 Vol. 35 p 293 and 1939 Vol. 36 p 240]. The infected hamster did not have its spleen previously removed and others in which that was done before inoculation proved negative, so that operation is not essential to success. Even if the result is regarded as grafting it still has value. Five similar experiments with hamsters some of which had their spleens previously

PELLAGRA.

PRECIS OF ABSTRACTS IN THIS SECTION

The effect of sunlight in producing symptoms of pellagra is discussed by BICKEL (p 543) and VILLARET *et al* (p 543). These authors report two alcoholic patients who had both suffered from general disabilities but exposure to the sun brought out the exanthem. Similarly KIELLAND (p 544) shows that the initial attack and relapses were connected with exposure to sunlight in a patient in Norway who had been feeling unwell for some time. His diet had been deficient in the PP factor. [See also this *Bulletin* 1937 Vol. 34 p 182.]

That there may be an endogenous factor in the aetiology of pellagra is suggested by the occurrence of that disease in uniovular twins reported by MAINZER (p 544). Although living far apart these twins developed pellagra at the same time but other members of the family did not.

DE LANGEN *et al* (p 545) remark on the possibility of pellagra occurring as a conditional deficiency as a result of various lesions or intoxications. Smoking may have a preventive effect but endocrine disturbances in women probably contribute to conditional deficiency. They think pellagra is not a pure vitamin B₃ deficiency but is more complex. Similarly SLATINEANU *et al* (p 545) consider that pellagra develops as a result of unbalanced diet in conjunction with organic insufficiencies. These are interdependent and may depend primarily on intoxication or infection. CLAUDIAN and GHERMANI (p 546) have found deficiency of vitamin C in pellagrins and non-pellagrous persons suffering from other diseases. Deficient supply and deficient assimilation probably occur. MAASSEN (p 546) reports a case of pellagra due to gastroenterostomy.

PAULY and DEPRECO (p 546) found marked changes in the cells of the anterior horns of the spinal cord in a case of pellagra. There was no subacute combined degeneration nor peripheral neuritis.

WATSON (p 547) considers that the estimation of porphyrin in pellagra by the B.E.S. test is unreliable and not specific and gives values too high when compared with those obtained by a modification of the Fikentscher method. DOBRINER *et al* (p 547) investigated the excretion of porphyrin in pellagra. The total amount and the amount in the urine fell during treatment. Porphyrinuria is not a constant feature of the disease and may be simply an indication of hepatic dysfunction.

IONESCO and CONSTANTINESCO (p 548) found that the serum carotin in a number of patients with pellagra was low. Creatinin and creatin were also low but increased under treatment by diet probably due to the excess of meat given. VILTER *et al* (p 548) found that the blood of pellagrins was relatively deficient in codehydrogenase as shown by the inability of *H. influenzae* to grow in high dilutions of blood in peptone water. Under treatment with nicotinic acid the codehydrogenase content was raised to normal. Pellagrins maintained on a pellagra-producing diet and treated with nicotinic acid and vitamin B₃ recover but may relapse. The administration of riboflavine cures these relapses. The authors advise a treatment which ensures adequate mixed vitamins. SLATINEANU and POTOP (p 549-50) find the polypeptides in the serum and C.S.F. of pellagrins to be

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increased but not proportionally. Sodium and potassium are decreased irregularly. In general these changes appear to be related to the mental symptoms.

Atrophy of the gastric mucosa with increased secretion and accelerated emptying was found in most of the patients examined radiologically by TYRDEL and TAMLER (p. 550).

Treatment by nicotinic acid and its derivatives is reported on favourably by a number of workers. The dosage required [see pp. 550 to 556] appears to vary considerably and daily amounts, usually in divided doses, of 150 mgm. in slight cases to 1000 mgm. in severe attacks have been given by the month. Doses administered by injection are 100 to 150 mgm. daily. For prevention the requirements also vary considerably. SCHMIDT & SYDENSTRICKER (p. 555) found 100 mgm. twice weekly to be insufficient. SPIES *et al.* (p. 553) and VILNER *et al.* (p. 554) found some improvement to follow the administration of give 2 to 5 cc. of coramine *per os* daily to a total of 50 cc. and VILNER *et al.* (p. 554) found some improvement to follow the administration of diminotinic acid and one of its derivatives. The usefulness of nicotinic acid-amine in skin lesions is shown by KUENAU (p. 556).

MAWSON BAKER and RANSFORD (p. 550) draw attention to the importance of the recognition of pre-pellagrous conditions, and SPIES *et al.* (p. 553) describe the nervous symptoms of pellagra which are not always recognized as such.

SYDENSTRICKER *et al.* (p. 551) show how the symptoms clear up under nicotinic acid and have examined its physiological effect in controls. SPIES *et al.* (p. 554) use vitamin B₃ to relieve the pain and numbness of peripheral neuritis in pellagra, and record the reactions of normal persons to the administration of nicotinic acid.

GRECOU *et al.* (p. 552) have not obtained such good results with nicotinic acid as have been reported from America, but the dosage used has been much smaller. ALROST *et al.* (p. 555) while recognizing the good effects of nicotinic acid in Egypt have not been able to reproduce the brilliant results obtained in America.

HARRIS (p. 556) describes three experimentally produced conditions in animals which are analogous to human pellagra—canine black tongue, monkey and pig pellagra. Nicotinic acid produces dramatic improvement.

AZARY (p. 557) used larostidine and found that the rash in 3 patients disappeared in three weeks. Some anti pellagra effect was observed after the use of various pyridine compounds by SPIES *et al.* (p. 557), and LEWIS (p. 557) obtained apparently good results with intravenous sodium thiosulphate, 10 cc. of a 10 per cent solution twice weekly in one patient.

NAPIER (L. Everard) Pellagra.—*Indian Med. Gaz.* 1939 Mar Vol 74 No 3 pp 137-142. With 5 figs. [10 refs.]

The author's intention is to draw attention to pellagra in India where he thinks, more cases would be diagnosed if the signs and symptoms were more widely recognized. He gives a long quotation from a Paris journal of 1755 and follows this with a systematic description in which the theories of causation are discussed and the pathological symptomatology and treatment adequately detailed.

C IV

SEN GUPTA (P. C.) RAI CHAUDHURI (M. N.) CHAUDHURI (R. N.) & NAPIER (L. Everard). Notes on Cases of Pellagra encountered in Calcutta.—*Indian Med Gaz.* 1939 Mar Vol. 74 No. 3 pp 143-145

Notes upon five cases of pellagra coming under care in Calcutta, where at the Tropical Medical School some twelve cases are seen each year. The cases described were typical and call for no comment.

H S Stannus

AMERICAN JOURNAL OF THE MEDICAL SCIENCES 1938 July Vol 196 No 1 pp 122-138 [80 refs. —Pellagra.

BICKEL (Georges). Alcoolisme chronique et pellagre révélée par une insolation accidentelle. [Chronic Alcoholism and Pellagra disclosed by the Effects of Sun Bathing].—*Schweiz. Med. Woch.* 1938 Oct 15 Vol. 68. No 42. pp 1159-1160 [16 refs.]

Writing from Geneva the author states that he has seen two cases of pellagra in three months and believes that the disease is commoner than is usually recognized. He reports the case of a man who had drunk half a bottle of whisky a day for the past 10 years and seen twenty-four hours after taking a sun-bath. Severe sunburn developed on the arms and legs, hands and feet there was burning of the tongue and gums, diarrhoea with twenty stools a day, mild delirium, coproporphyrinuria and general asthenia.

The previous history showed that each spring for five years he had had stomatitis and glossitis, mild dermatitis, irregular bowel action and some change in character. Five doses of 0.1 gm. a day nicotinic acid caused immediate benefit—in four days all symptoms had cleared except the weeping lesions on the hands which took five weeks to heal.

H S S

VILLARET (Maurice) JUSTIN BESANÇON (L.) KLOTZ (H. Pierre) & SIKORAY. Pellagre chez un alcoolique révélée par un essai d'hélio-thérapie d'une polymérite. [Pellagra in an Alcoholic Subject revealed after Exposure to Sunlight].—*Bull. et Mém. Soc. Méd. Hôp. de Paris* 1939 Mar 13 53th Year 3rd Ser No 8 pp. 367-371

An account of a 48-year-old male alcoholic in whom the diagnosis of pellagra was revealed by the appearance of a typical skin rash on the lower parts of the legs and dorsa of feet following upon an exposure to the June sunshine of Paris in an attempt on the part of the patient to treat the loss of power in the lower limbs. The symptoms which were antecedent to the exanthem, consisted in a general asthenia, progressive anorexia to complete loss of appetite associated with vomiting and wasting. The muscles of the legs were markedly affected and walking was almost impossible. Knee jerks were feeble, Achilles jerks absent with hypo-excitability to the Faradic and Galvanic currents. There were also noted amblyopia with central scotoma for green and pallor of the optic discs.

Treatment consisted in giving vitamin B₁, yeast and liver extract. The skin lesions improved in a few days and on discharge from hospital a month later the patient had gained 5 kilos. in weight. H S S

KIRLLAND (J) Et tilfelle av pellagra med opblussing av symptomene efter soiling [Pellagra and the Effect of Sunlight in producing Symptoms.]—*Nordisk Med* 1939 Vol. 1 No. 10 pp. 663-696
English summary

Eight cases have been recorded in Norway since pellagra was first seen in that country in 1934. The present case is of more than ordinary interest because the initial attack and relapses were distinctly and intimately connected with exposure to sunlight.

A man of 49 years who had been feeling "below par" for some time seized the opportunity of the first brilliantly sunny day of the year in May 1937 to sun-bathe. Within two days he had attacks of diarrhoea and his hands became very red and he felt greatly depressed. The backs of the hands were red, dry and scaly, the tongue was red. A test-meal revealed achlorhydria. He improved much with dietetic treatment but twice afterwards the glossitis and dermatitis recurred after exposure to the sun. He was then given a course of dieting rich in the PP factor and recovered and on taking such diet was able to subject himself to the sun's rays without showing the above symptoms. His diet prior to his illness had been deficient in the PP factor.

The author quotes SMITH & RAFFIN who kept 35 pellagrins in bed on a diet poor in PP factor till the symptoms disappeared and then exposed them and a number of controls to small doses of sunshine. None of the controls showed any symptoms, but 20 of the 35 others showed dermatitis and aggravation of their pellagra symptoms.

H H S

MAINZER (Fritz) Ueber Pellagra. I. Mitteilung Pellagra bei einigen Zwillingsschwwestern. [Pellagra in Uniovular Twins.]—*Acta Med Scandinavica* 1939 Vol. 99 No 2-3 pp 292-296
With 6 figs [31 refs.]

That there may be an endogenous as well as an exogenous factor concerned in the aetiology of pellagra is a matter of considerable interest. The question was discussed for the first time by the reviewer [this *Bulletin* 1937 Vol. 34 p 183]. In this article by Dr Mainzer, Director of the Jewish Hospital Alexandria, the point receives further confirmation by the occurrence of pellagra in uniovular twin sisters aged 23 years. These two young women after living apart from each other the one in France and the other in Alexandria, for 3 years developed pellagra on four occasions at the same times. A sister and two brothers who partook of the same diet showed no evidence of the affection, the diet itself did not appear to have been qualitatively deficient. All members of the family ate a moderate amount of maize.

The dermal lesions, mental symptoms and blood pictures in both were identical. In both the same degree of diminution of basal metabolism was found. Gastric acidity was only determined in one—achlorhydria was discovered. Other points noted in both were the same marked degree of myopia, identical electrocardiograms, the same low normal values for fasting blood sugar with the same blood sugar curves after insulin. Serum nitrogen, chloride, uric acid and cholesterol identical values, etc. The blood pressure was higher in one sister than in the other.

H S S

MAINZER (F) Die Aetiologie der Pellagra. Uebersichtsreferat ueber die Entwicklung und den gegenwärtigen Stand der Frage (1914-1938). [The Aetiology of Pellagra. A Review of Modern Work and Opinions.]—*Ztschr f Vitaminf* Berne 1938/39 Vol. 8. No 4 pp 347-365 With 2 figs. [91 refs]

DE LANGEN (C D), BOSWIJK (J C.) & VAN NIEUWENHUIZEN (C L C.) Een endemie van pellagra genezen met nicotinezuur [An Endemie of Pellagra cured with Nicotinic Acid.]—*Nederl Tijdschr v Geneesk* 1938. Oct. 8 Vol. 82. No 41 pp 4970-4976 With 2 plates. [19 refs.] English summary

Ten patients were found in a mental asylum suffering from pellagra. Nine of these were treated with nicotinic acid and were completely cured of pellagra the tenth was not treated and died. There was no difficulty in the diagnosis as the patients had a typical syndrome. All were females four of them were housed in the same pavilion and three in neighbouring pavilions. Six of these patients were "negativistic" and had to be fed. In one ill-nourished patient pellagra developed during treatment with cardiazol injections. Some of these accompanying conditions suggest the possibility of secondary pellagra a conditional deficiency such as may be seen in gastric cancer ulcerative colitis chronic alcoholism as a sequel to gastroenterostomy in syphilis of the stomach and benign stricture of the oesophagus. It is remarkable that all the pellagra sufferers in this institution were women and in view of the instant effect of treatment with nicotinic acid there seems reason to believe that the smoking habits of the men had a preventive effect. It is the opinion of the authors however, that that is not the whole explanation and that endocrine disturbances in women can be contributory to conditional deficiency. They think it probable also that pellagra may be of complex pathogenesis and just as beriberi is not a pure B_1 avitaminosis so is pellagra not a pure B_3 avitaminosis. Dosage in treatment still awaits exact definition. It seems possible to give more than 1 gm. daily. In the present cases 50 mgm. were administered 3 to 4 times daily in milk with little indication of toxic effect. Some patients developed an erythema over the whole body which usually lasted no more than 15 minutes but might do so for some hours. W F Harvey

SLĂTINEANU (AL) BALTEANU (I) SIBI (M) NITULESCU (I) & LEVIT (V) Contribution à l'étude du chimisme intestinal dans la pellagre. [Chemical Changes in the Intestine in Pellagra.]—*Bull Acad Méd Roumanie* 1938 3rd Year Vol. 5 No 4 pp 489-503 [38 refs.]

— — — NITULESCU (I) & LEVIT (V) Contribution à l'étude du chimisme intestinal dans la pellagre — *Bull Office Internat d'Hyg Publique* 1938 Oct Vol. 30 No 10 pp 2265-2274 [32 refs]

The authors views upon the aetiology of pellagra may be thus translated —

Pellagra develops as the result of an unbalanced and one-sided diet reacting upon an organism suffering from organic insufficiencies—gastric intestinal hepatic and renal these are interdependent and may depend primarily upon an intoxication (alcohol) or an infection (malaria, syphilis, etc.)

They hold that it is essential to treat the chronic gastritis, the liver insufficiency, the intestinal disorders, etc. as these conditions may not only cause lack of absorption of essential food principles but allow of the absorption of poison and disallow detoxication.

In support of their beliefs they find that pellagrous diets lead to acid production: the faeces are acid with increase in organic acids, the pH commonly being about 6. This indicates fermentative bowel flora.

The salicylate reaction points to a loss of detoxication power by the liver. Albumin is lost into the bowel and undergoes putrefaction with the formation of amino-acids and enormously increased ammonia. Histamine-like substances—cadaverine, guanidine, putrescine—are present, also sulphur compounds porphyrin, indol, skatol, phenols, etc. are all increased. Vitamins produce a transitory beneficial effect but vitamin deficiency is not the real cause of pellagra.

H S S

CLAUDIAN (I.) & GHERMANI (A.) Recherches sur la carence de vitamine C chez les pellagriques, par le test de saturation. [Vitamin C Deficiency in Pellagrics, gauged by the Saturation Test.]—*C. R. Soc. Biol.* 1938. Vol. 129. No. 33. pp. 999-1003.

Clinically pellagra often suggests a plurivitaminic deficiency state. Some observers have believed that a vitamin C deficiency occurs in some cases and good results have been noted following the administration of this factor.

Using the saturation test of HARRIS and RAY and the intravenous method of administration of ascorbic acid, the work being carried out in the winter and early spring, the authors have found a retention of considerable degree not only in pellagrics but also in non-pellagrous inhabitants living under the same conditions in Rumania. Among patients admitted to hospital for other conditions, including cirrhosis of the liver, gastric carcinoma, Graves' disease and pernicious anaemia similar figures were obtained, but in normal healthy well-fed individuals there was no evidence of deficiency of vitamin C. They suggest that states of deficiency may arise both from a deficiency in food supply and from a defect in assimilation.

H S S

MAASSEN (Reimer). Sekundäre Pellagra nach Gastro-Enterostomie (B_{12} -Komplex Avitaminose). [Secondary Pellagra after Gastro-Enterostomy.]—*Deut. Med. Woch.* 1939. Sept. 23. Vol. 64. No. 39. pp. 1363-1369.

Report upon a typical case of pellagra with dermal and psychotic manifestations etc. associated with achylia, due to gastro-enterostomy and entero-anastomosis for simple pyloric stricture observed in Gorlitz.

Treatment consisted in a diet rich in vitamin B_{12} and B_{12} injections of liver extract and nicotinic acid.

H S S

PAULY (R.) & DEFRECO (M.) Pellagre et troubles nerveux. [Pellagra and Changes in the Nervous System.]—*Jl. Méd. de Bordeaux* 1939. Feb. 11-16 & 23. Vol. 116. Nos. 6-7 & 8. pp. 145-156. 163-164. With 6 figs. [84 refs.]

The substance of this long article deals with a single case of pellagra, clinical notes, post mortem findings and histo-pathological examination.

with special reference to the nervous system a second almost identical case is noted but not detailed

The authors point out how very few cases of pellagra have been published in France since the War and that in consequence ignorance concerning pellagra and especially of the nervous lesions of the disease has come to be widespread. The case described was that of a woman a chronic alcoholic aged 34 seen at Bordeaux in 1934 in third relapse. Both patients died. No treatment is mentioned as having been given. The lengthy anatomic-pathological descriptions it would be difficult to summarize here but it is remarked in regard to the C.N.S. that while degeneration of hyalin sheaths was absent cell changes were marked especially in the anterior horns of the cord. The changes of a subacute neuritis wanting. Some general discussion on the neurological and psychical symptoms in pellagra is followed by a discussion upon anatomic-pathological findings and then a section upon aetiology in which the authors appear to incline towards a theory which would include vitamin deficiency toxic agents or virus infection

H S S

WATSON (C J) The Urinary Pigments in Four Cases of Alcoholic Pellagra.—*Proc Soc Experim Biol & Med* 1933. Dec Vol. 39 No 3 pp 514-518 With 1 fig

Writing from the University of Minnesota the author points out that the method of estimating porphyrin in the urine in pellagra adopted by BECKH ELLINGER and SPIES (B.E.S. test) is far from reliable the results compared with those obtained by a modification of the Fikentscher method (red fluorescence in U.V. light with the Zeiss stufenphotometer) are far too high. Beckh and his colleagues obtained figures as high as 100 mgm. per litre whereas with the newer test the figures never exceeded 0.6 mgm. per day. The higher figures correspond very much with those obtaining in idiopathic porphyrinuria but red urine has never been described in pellagra. The fact is that the B.E.S. test is not specific for porphyrin. Other pigment bodies possibly having a common origin with porphyrin give positive reactions such bodies might originate by esterification or conjugation. On the other hand it is suggested they might be indigo derivatives—indirubin indirupurin.

[The B.E.S. method consists of the extraction of acidified urine with ether after which the ether is extracted with a small amount of 25 per cent. HCl. Red or red violet colour is considered to be due to porphyrin and is estimated colorimetrically with a standard porphyrin solution. See *Quart J Med* 1937 Vol. 6 p 305]

H S S

DOBRINER (Konrad) STRAIN (W H) & LOCALIO (S A.) The Excretion of Porphyrin in Pellagra.—*Proc Soc Experim Biol & Med* 1933. June Vol. 38 No 5 pp 748-752. With 1 fig [11 refs]

A case of pellagra has been studied in order to determine whether the increased output of porphyrin in the urine is due to a normal total output with an increased proportion excreted by the liver through the urine or not also whether the porphyria represents a simple increase of a normal process due to increased haematopoiesis or a pathological metabolism of pigments marked by the excretion of coproporphyrin Type III

The case was a typical alcoholic case with dermatitis stomatitis, vulvitis and diarrhoea. Free hydrochloric acid was present in the gastric juice. Treatment was by yeast and liver extracts. During a 6-day observation control period the total coproporphyrin excretion averaged 897 mgm. per day of this 254 mgm. were excreted in the urine. In the first nine days of therapy coincidentally with clinical improvement, the total excretion fell to a daily average 458 mgm., of which 157 were found in the urine. Large amounts of protoporphyrin and δ-tertoporphyrin were also found in the faeces possibly due to bleeding into the bowel.

The excreted coproporphyrin was a mixture of Types I and III the first determined by melting point the second in only small amounts, insufficient for final determination. This mixed porphyrin excretion is similar to that reported in pigment cirrhosis of the liver and lead poisoning and differs from that of pernicious anaemia haemolytic jaundice, etc., in which only Type I is produced and excreted.

The porphyria in pellagra must be interpreted with care. It is not a constant feature of the disease. It may be simply an indication of hepatic dysfunction.

H S S

LOVINESCO (N Grila) & CONSTANTINESCO (P) Recherches de laboratoire dans la pellagre. [Laboratory Research in Pellagra.]—*Bull et Mém Soc Méd. Hôp. de Bucarest* 1938. Nov-Dec. Vol. 20. No. 8-10 pp 305-315

(a) Using the method of HALDEN and UNGER with the aid of Pulfrich's photometer estimations of the serum carotin in 21 pellagrins were made. In 7 cases it was below normal limits (0.02 to 0.11 mgm. per litre) in the remainder there was a tendency towards the lower limit. In 18 cases the average figures obtained before and after treatment were 0.0263 mgm. and 0.0338².

In 7 of the 21 cases palmo-plantar xantho-chromia was noted but no corresponding increase in serum carotin was found. It is suggested that either this colouration in cases of pellagra is not due to carotin or that in this disease carotin may become fixed in the tissues with consequent reduction in the blood.

(b) In the same series of cases using the technique described by RAPPAPOORT and GEIGER, fibrinogen was found to be present in normal amounts. Accompanying successful treatment a slight increase was noted.

(c) In 28 cases of pellagra determinations of creatinin and creatin were made using the method of LIEB and ZACHAR. Totals tended to be at the region of the lower limits of normal (or actually diminished according to French standards) but while the creatinin values are much increased, those for creatin are proportionately diminished.

As the patient improves under treatment by diet the figures tend to become readjusted (probably due to the excess of meat given) H S S

VILTER (Richard W) VILTER (Sue Potter) & SPIES (Tom D) Relationship between Nicotinic Acid and a Coenzyme (Cozymase) in Blood of Pellagrins and Normal Persons.—*J Amer Med Assoc* 1939 Feb 4 Vol. 112. No. 5 pp 420-422. [11 refs.]

Using the knowledge made available by the LEWIS, namely that bacilli of the influenza group will not grow in culture devoid of what

was called growth factor V now identified as coenzyme (coferment of WARBURG) and that the organisms cannot synthesize it from its components—nicotinic acid amide, adenylic acid, ribose and phosphoric acid. The authors decided to test the coenzyme blood content in pellagrins. The actual method employed will not be detailed here but the results are expressed in blood dilutions which would support growth. With four normal controls dilutions in peptone up to 1:12,000 supported growth of *Haem influenzae* the blood of three pellagrins in dilutions of only 1:2,000.

Maintained on a pellagra producing diet but treated with nicotinic acid growth promoting activity of the blood of the pellagrins was raised to normal.

It is argued that coenzyme (coferment) is significantly raised by nicotinic acid therapy and the hypothesis is suggested that the value of nicotinic acid in pellagra depends on the synthesis of nicotinic acid nucleotide and finally of coenzyme in the body.

Supplementary observations showed that in one case of pellagra with mental symptoms the blood contained no growth promoting factor V at all. After 2 days treatment with 500 mgm. nicotinic acid the symptoms cleared and growth occurred in a 1:4,000 dilution.

In 3 cases of diabetes mellitus with severe acidosis the coenzyme content was found to be markedly lowered but return to normal occurred with correct diet or insulin or nicotinic acid.

In 2 cases of lymphatic leukaemia which had been treated by X rays growth supported only in 1:1,000 dilution and no improvement occurred after nicotinic acid therapy. Three cases of malignant disease and one of Hodgkin's disease supported better growth than normal. One case of pernicious anaemia at a dilution of 1:8,000. The V factor may also be demonstrated in the urine.

The other part of the paper deals with the probability of another factor being concerned in pellagra.

It has been shown that pellagrins maintained on a pellagra-producing diet with supplements of nicotinic acid and vitamin B₁ lose their symptoms but that some of them relapse. A further study was made on four cases of endemic pellagra from Birmingham, Ala. were maintained on a pellagra-producing diet plus 100–400 mgm. synthetic nicotinic acid and 10 mgm. synthetic vitamin B₁ each day. Within 1 to 2 months the patients began to lose appetite and weight and a mild dermatitis appeared and this clinical picture persisted unchanged for the next 10 months. Fifty mgm. riboflavin on two successive days were then administered. Within 48 hours improvement occurred with increased vigour and sense of well-being and the skin changes were less marked.

The authors believe that riboflavin is useful in human nutrition and in pellagra in relapse and that as diseases due to deficiency of water soluble vitamins are of complex origin treatment should include the administration of mixed vitamins.

H S S

I. SLATINEANU (AL) & POTOP (I) Recherches sur le taux des polypeptides dans le sang et dans le liquide céphalo-rachidien chez les pellagriques [The Polypeptide Content of the Blood and Cerebrospinal Fluid in Pellagrins.]—C R Soc Biol 1938 Vol. 129 No 30 pp 713–715

ii. SLATINEAXU (Al.) & PUTOP (I) Le sodium et le potassium du sérum et du liquide céphalo-rachidien dans la pellagre. [The Sodium and Potassium Content of the Blood and Cerebrospinal Fluid in Pellagra.]—*Ibid* pp. 718-720

i. Estimations were made among several groups of pellagrins numbering 50 in all. The authors found that the polypeptides in serum and in cerebrospinal fluid are in general augmented in quantity but great variations occur. The polypeptides in blood and C.S.F. are not proportional. The variations of the polypeptides of the C.S.F. are independent of the variations in non-protein N and of albumin in the C.S.F. In the majority of cases the variations in the polypeptides of C.S.F. appeared to be related with changes in mental conditions.

ii. Considerable variations of total sodium and potassium occur in serum and C.S.F. of pellagrins (58 cases). The totals for each do not run parallel in the serum nor in the C.S.F.

Blood potassium tends to be diminished in psychotic cases, in C.S.F. there is great variability. Blood sodium tends also to be diminished and in the C.S.F. variations occur as seen in the blood.

H S S

TRYDEL (M.) & TAMLER (A.) Röntgenuntersuchungen des Magens bei Pellagra [X-ray Examinations of the Stomach in Pellagra.]—*Med Klin* 1938 Aug 19 Vol. 34 No. 33 (1756) pp 1090-1091

Thirteen cases of pellagra were submitted to careful X-ray examination of the stomach. In eleven a complete atrophy of the folds of the mucous membrane was demonstrated. In all marked increase in gas retention was shown throughout the gastro-intestinal tract and in most signs of increased secretion and accelerated emptying while the great proportion showed pathological alteration in form of the stomach either elongation or dilation.

H S S

MANLON BARR (Philip) & RANSFORD (O. V.) Stomatitis of Vitamin-B₂ Deficiency treated with Nicotinic Acid.—*Lancet* 1938 Aug 20 pp 428-429 12 refs.]

The authors report an interesting example of the condition which they refer to as the pre-pellagrous state and the result of treatment with nicotinic acid.

A married woman aged 62 gave a history of 5 years morning diarrhoea raw sore tongue and soreness at the angles of the mouth. Later tingling sensations and numbness down the outer side of one leg were complained of. Examination revealed little beyond a distended abdomen, exaggerated deep reflexes a mild microcytic anaemia and a considerable hyperchlorhydria. The patient complained of malaise and depression.

Treatment consisted of an alkaline mixture and 150 mgm. nicotinic acid daily. The diarrhoea ceased immediately in 48 hours the lips had healed and the tongue was clearing up. At the end of 10 days the patient was practically well.

[This case serves to illustrate the importance of recognizing these conditions of pre-pellagra or sub-pellagra. They may be more frequent in temperate climates than is usually believed. At the same

tune the authors statement In temperate climates the skin lesions of pellagra do not appear needs modifying cases of this disease with typical dermatitis occur in England as everywhere else.]

H S S

SYDENSTRICKER (V P) SCHMIDT (H L) JR FULTON (M C.) NEW (J S) & GEESLIN (L E.) Treatment of Pellagra with Nicotinic Acid. Observations in Forty-five Cases.—*Southern Med J* 1938 Nov Vol. 31 No 11 pp 1155-1163 [17 refs.]

Forty-five cases of pellagra (40 endemic 2 alcoholic 3 secondary) were treated in the University Hospital Augusta Georgia with nicotinic acid. The physiological effect of the drug was also essayed in controls 10 whites and 7 negroes It was found that 75 to 100 mgm. produced flushing tingling and tachycardia and lowering of blood pressure occurred with bigger doses—250 to 1 000 mgm. There was also an increased gastric acidity in most cases comparable with that produced by histamine

Full case notes are given of the 45 individuals 30 of whom had suffered previous attack They were all typical and need not be further detailed here

The authors appear to consider the most beneficial dosage to be 600 mgm. daily for 3 days followed by a daily maintenance dose of 100 mgm. in four fractions at 4-hourly intervals

Glossitis stomatitis and diarrhoea cleared up in 24 hours the dementia in 3 to 5 days and the dermatitis in a week With this treatment previously diminished gastric hydrochloric acid increases or reappears if previously absent in most cases porphyrimuria disappears.

H S S

REFFIN (Julian M) & SMITH (David T) Treatment of Pellagra with Special Reference to the Use of Nicotinic Acid.—*Southern Med J* 1939 Jan Vol. 32. No. 1 pp 40-47 With 4 figs [33 refs.]

A short article reporting a small series of cases of pellagra treated with nicotinic acid in dosage corresponding to 1.5 mgm. per kilo body weight daily parenterally at Duke University School of Medicine Durham N Carolina Results were comparable to those obtained by other American observers

H S S

MATTHEWS (R. S) Pellagra and Nicotinic Acid.—*Jl Amer Med Assoc* 1938. Sept 24 Vol 111 No 13 pp 1148-1153

Case reports to illustrate the curative value of nicotinic acid in pellagra from Columbia South Carolina.

The spectacular disappearance of gastro-intestinal and mental symptoms is remarked and the necessity of treating neuritic symptoms with vitamin B₃ is pointed out. The author has used a 1 per cent. solution of nicotinic acid prepared by Merck in doses of 20 to 30 cc. up to a total of 1 000 mgm. daily or in doses of 10 cc (sterilized) intravenously or intramuscularly up to 100 mgm.

H S S

GRECOU (Aurel) IONESCOU (N. Grub) & CONSTANTINESCOU (P.). L'acide nicotinique dans le traitement de la pellagre. [Nicotinic Acid in Pellagra].—*Bull et Mém Soc. Méd Hôpôt de Bucarest* 1938 Nov-Dec. Vol. 20 No 9-10. pp 283-299 [34 refs.]

After referring to the observations of others upon the subject the authors report in short eighteen cases of pellagra treated at Pancepti and Ploesti with nicotinic acid. While admitting that this substance is not without some use in the treatment of the disease their results fall far short of those published in America. It is suggested that the disease as seen in America and as seen in Rumania possesses a rather different clinical picture and that this in turn depends upon some difference in the grouping of deficient factors, so that while in America nicotinic acid yields brilliant results in Rumania they are less satisfactory.

[Another possible explanation may be that the dosage of the drug was much smaller than that now commonly used in America. The Rumanian observers at the same time do not appear to have appreciated the fact upon which American writers have laid stress, namely that the amount of nicotinic acid required in individual cases varies very widely.]

H S S

RACHMILEWITZ (M.) & GLUECK (Helen L.) Treatment of Pellagra with Nicotinic Acid.—*Brit Med J* 1938. Aug 13 pp 348-349 [10 refs.]

BRITISH MEDICAL JOURNAL 1938. Aug 13 pp. 353-354—
Nicotinic Acid for Pellagra.

In this article is given an account of two very typical cases of pellagra treated at the Rothschild Hadassah Hospital, Jerusalem, by nicotinic acid. All signs and symptoms (except disordered patellar reflex) cleared up including skin lesion diarrhoea mental disturbance, etc. The glossitis which was present in one of the cases was the first condition to improve. [It is, however noteworthy that in the second case the much more severe of the two there was no glossitis. This absence of glossitis may occur in any series of cases as has been pointed out elsewhere. But the cure of the glossitis has been used by a number of observers as the index of an antipellagrous substance, including nicotinic acid. How then is explained the absence of glossitis in cases presumably suffering a nicotinic acid deficiency? As has been suggested by the reviewer elsewhere a study of the exceptional cases may throw considerable light on the subject their explanation is urgently needed.]

In the leading article a short account is given of the history of the introduction of nicotinic acid in the treatment of pellagra. H S S

BERNTH (O.) & STURUP (G. E.) Nikotinsyrebehandling af pellagra. [The Treatment of Pellagra with Nicotinic Acid].—*Ugeskr f Læger* 1938. Vol. 100 pp. 1137-1140 [13 refs.]

RAVX (J.) Et tilfælde af pellagra behandlet med nikotinsyre. [A Case of Pellagra treated with Nicotinic Acid].—*Ibid* pp 1140-1141

The case recorded by Bernth and Stürup was that of a woman, aged 41 with gastric achylia, anaemia depression, lassitude anorexia,

glossitis skin and mucous membrane changes characteristic of pellagra and violent diarrhoea. The administration of nicotinic acid stopped the diarrhoea at once. The cutaneous manifestations disappeared in a fortnight and the mental condition improved.

Ravn's patient was a 30-year-old woman suffering from schizophrenia and typical pellagra. The administration of nicotinic acid was followed by rapid improvement the stomatitis and diarrhoea disappearing first, and the changes in the skin somewhat later

C Lillingston

SPIES (Tom Douglas) ARING (Charles Dair) GELPERIN (Jules) & BEAN (William Bennett) The Mental Symptoms of Pellagra. Their Relief with Nicotinic Acid.—*Amer Jl Med Sci* 1938. Oct. Vol. 196. No 4 pp 461-475 [21 refs]

A paper read at Atlantic City reciting the many nervous symptoms which may be witnessed in pellagra. These symptoms are well known to pellagrolgists but in practice not always recognized for what they are. Many are neurasthenic in type—fatigueability insomnia anorexia vertigo palpitation headache nervousness unrest apprehension anxiety forgetfulness and paraesthesiae

There may be also loss of memory disorientation confabulation and confusion or further excitement delirium mania or depression. There may be a trend towards a paranoid reaction with fears of relatives and delusions of persecution. [That such symptoms may occur when the more ordinarily recognized signs of pellagra are mild or wanting should never be lost to mind.]

Sixty acute cases with mental manifestations were submitted to treatment by nicotinic acid or coramine after a period of observation without any other supplement to a control diet. Recovery took place in all cases in from 10 hours to 6 days and no recurrence occurred if a maintenance dose of nicotinic acid was kept up. If the dosage was stopped relapse occurred in a third of the cases. Nicotinic acid also was shown to prevent the development of mental symptoms in cases of subclinical pellagra. It will be noted that only acute cases were treated. Some 26 other cases—Korsakow's psychosis manic depressive states involutional insanity schizophrenia etc. received no benefit from similar treatment.

The dosage of nicotinic acid used was 500 to 1,000 mgm. daily by mouth or 5 doses of 20 mgm. daily intravenously that of coramine, the diethylamide of nicotinic acid was 2 to 5 cc daily by mouth to a total of 20 to 50 cc.

H S S

BOGART (C. N) Nicotinic Acid in the Treatment of Pellagra. Report in a Case of Marked Dementia.—*Jl Amer Med Assoc* 1938. Aug 13 Vol. 111 No. 7 pp 613-614

A severe case of pellagra of endemic type in sixth relapse with dementia. Recovery was complete after seven days treatment with 5 daily doses of 100 mgm. nicotinic acid. The case is published to emphasize the effect of the drug in acute pellagrous dementia.

H S S

[July 1939]

SPIES (Tom Douglas) BEAN (William Bennett) & STONE (Robert E.)
 The Treatment of Subclinical and Classic Pellagra. Use of
 Nicotinic Acid, Nicotinic Acid Amide and Sodium Nicotinate,
 with Special Reference to the Vasodilator Action and the Effect on
 Mental Symptoms.—*Jl Amer Med Assoc* 1938. Aug 13
 Vol. 111 No. 7 pp 594-599 With 2 figs. [11 refs.]

The authors in treating 79 cases of pellagra in hospital found that within 72 hours of the administration of large doses of nicotinic acid amide [coramine] fading of the mucous membrane lesions and blanching of the cutaneous lesions when present regularly occurred at the same time the functions of the gastro-intestinal tract tended to return to normal, there was remission in mental symptoms and porphyrinuria decreased. The peripheral neuritis was not relieved but pain and numbness disappeared 48 hours after the injection of 50 mgm. vitamin B₁ twice daily. Subsequently 98 relapsing cases of pellagra were treated at their own homes without any change of conditions. Within three days these pellagrins volunteered they felt much better and that dizziness depression burning sensations, confusion and upset head had disappeared. This improvement after several weeks was however not maintained though good effect was observed on increasing the dosage. This experiment is still being carried on.

It was noted that in pellagrins each individual varied very greatly in response to the same dosage and very differently to different dosage. The same was true of normal persons treated with nicotinic acid—the amount which will produce a reaction varies very greatly in different individuals and in the same individual at different times. In pellagrins there is an increased need for nicotinic acid with infection fever or exercise. The reactions to nicotinic acid were studied in normal individuals.

The flushing, tingling increased warmth etc are most marked on the ears and over the malar regions and neck, the flush is blotchy over the trunk and less marked over the abdomen and extremities. Circumoral pallor may be noticed. The perineal region and axillae may be affected—increased warmth sweating and itching. No changes in the tongue or mucous membranes have been noted. Nausea vomiting and abdominal cramps may occur but there is no constant deviation of pulse-rate blood-pressure respiration or electro-cardiogram. The reaction appears to differ from that produced by acetylcholine or histamine.

H S S

VILTER (Sue Potter) BEAN (William Bennett) & SPIES (Tom Douglas)
 Further Observations on the Effect of 2, 6-Dimethyl Dimicotinic
 Acid and Dimicotinic Acid on Pellagrins in Relapse and on Normal
 Persons.—*Southern Med Jl* 1938 Nov Vol 31 No 11
 pp 1163-1164

Experiments were made concerning the value of 2, 6-dimethyl pyridine-3, 5-dicarboxylic acid and 3, 5-pyridine dicarboxylic acid in the treatment of 9 pellagrins given in doses of 500 to 1,000 mgm per chem. Some improvement was observed in 5 cases these substances are of little use in the treatment of pellagra. It was also found that the physiological response as witnessed in the pellagrins and 2 controls differed from that of nicotinic acid in that there were no vasomotor reactions.

H S S

SPIES (Tom D) GRANT (Jean M) STONE (Robert E.) & McLESTER (James B) Recent Observations on the Treatment of Six Hundred Pellagrins with Special Emphasis on the Use of Nicotinic Acid in Prophylaxis.—*Southern Med J* 1938 Dec. Vol. 31 No 12. pp 1231-1237 {13 refs.}

Much has already been written upon the treatment of pellagra by nicotinic acid. The present article deals with the evaluation of the pellagra-preventive properties of this substance in persons who having had pellagra with relapse had remained in their usual surroundings on their usually grossly inadequate diet and in whom recurrence appeared imminent.

In 173 so selected persons treated with nicotinic acid no relapse occurred whereas the relapse rate in control groups was between 85 and 100 per cent.

The necessary dosage was found to vary very greatly. Three persons remained free of pellagra symptoms on 50 mgm daily two required 1 000 mgm. daily to keep them free. As the relapse season advanced so the dose had to be increased. The study was carried out in Birmingham and Jefferson City Alabama between 15th February and 1st September 1938.

In a few cases treatment was discontinued for 1-2 weeks with the prompt appearance of symptoms of subclinical pellagra.

A number of cases developed the polyneuritis of pellagra while under treatment which in turn responded to exhibition of vitamin B₁.

H S S

SCHMIDT (H. L.) Jr & SYDENSTRICKER (V. P.) Nicotinic Acid in the Prevention of Pellagra. A Preliminary Note.—*J Amer Med Assoc* 1938 June 18 Vol 110 No 25 pp 2065-2066

The authors thought it would be of interest to find out whether nicotinic acid is a potent substance in preventing relapse in pellagra. To this end were selected from a pellagra outpatient clinic 33 subjects who had had pellagra, and were showing signs of relapse on 9th March, 1938.

To sixteen, 100 mgm nicotinic acid were given twice a week. to the other seventeen, 90 gm. yeast daily were given as controls. The patients remained on their own home diet. Treatment was carried on for the period 16th March to 27th April. The control (yeast) group showed good general improvement though in most cases some glossitis persisted. Among those treated with nicotinic acid, with one exception though there was a rather dramatic improvement in the first two weeks, retrogression soon set in and their condition at the end of the experiment was as bad as at the beginning. The authors point out that the yeast besides containing specific factors also affords a considerable amount of nutriment.

H S S

1. ALPORT (A. Cecil) GHALIOUNGUI (P) & HANNA (G) Treatment of Pellagra with Nicotinamide.—*Lancet* 1938 Dec 24 pp 1460-1463

II. LANCET 1938 Dec. 24 pp 1473-1474 {13 refs.}—Treatment of Pellagra.

I. Fifteen cases of typical pellagra as it occurs among the Egyptian fellahen were treated with nicotinamide in ten, with nicotinic acid in

five while remaining on an ordinary diet. Great improvement was effected in the acute mucous membrane lesions and a slower improvement in the acute skin conditions was noted. Chronic skin lesions in friction areas and chronic atrophic changes in the tongue were only slightly affected. The appetite, mental condition and general physical health of all the patients were improved by the treatment, but gastric acidity never reappeared. Despite the excellent results obtained in the small series of cases the authors say —

While we feel satisfied that it is the most effective treatment we have yet tried, we could not confirm the brilliant results obtained after only 24-48 hours by some observers.

11 In the leading article a résumé of some of the papers on the subject which have appeared in the last two years [all of which have been summarized in this *Bulletin*] is given.

[The writer of the article unfortunately appears to lay stress on the pellagra producing action of maize which is a pity in view of the fact that maize *per se* is not the cause of pellagra. It is of course true as is pointed out that SWAMINATHAN (*Nature* 1938 Vol. 141 p. 830) has shown that while wheat contains 5.33 mgm per 100 gm of nicotinic acid and rice 2.4 to 2.8 mgm, white maize only yields 1.5 mgm.]

H S S

ALPERT (A Cecil) & GHALIOUXOVI (P) Ueber die Behandlung der Pellagra in Ägypten mittels Nikotinsäureamid. Ein Bericht von 20 Fällen [The Treatment of Pellagra in Egypt with Nicotinamide. A Report of Twenty Cases.]—*Arch f Schiff u Trop Hyg* 1939 Jan Vol. 43. No 1 pp. 34-38. [11 refs.]

ALPERT (A Cecil) GHALIOUXOVI (P) & HANNA (G) Pellagra and its Treatment with Nicotinic Acid and Nicotinamide with a Review of the Literature.—*Jl Egyptian Med Assoc* 1938, Dec. Vol. 21 No 12. pp. 750-761 [15 refs.]

KUHNAU (Wolfram W) Pellagraheflung durch Nikotinsäure-Amid. [Treatment of Pellagra with Nicotinic Acid-amide].—*Med Klin* 1938, Aug 19 Vol. 34 No. 33 (1756) pp. 1088-1090. With 4 figs.

An account of two cases of pellagra treated at Bonn with nicotinic acid amide. The skin lesions responded rapidly. That the psychological symptoms would similarly clear up was expected but not realized.

H S S

HARRIS (Leslie Juhus) The Vitamin B₃ Complex. VIII. Further Notes on "Monkey Pellagra" and its Cure with Nicotinic Acid.—*Biochem Jl* 1938 Sept. Vol. 32 No. 9 pp. 1479-1481 With 1 fig. [11 refs.]

Three experimentally produced conditions in animals have been considered as analogous to pellagra in the human being—canine "black tongue" so called "monkey pellagra" and what has been designated pellagra in pigs.

The present article supplements the author's preliminary paper of last year on "monkey pellagra." Monkeys kept on a basal diet resembling Goldberger's "black tongue" diet containing adequate

amounts of vitamins A B C and D develop deficiency symptoms consisting of loss of appetite diarrhoea vomiting loss of weight a pallor of the skin some loss of fur "jumpiness" and more marked emaciation ending fatally—symptoms which are referred to as 'monkey pellagra'. The exhibition of nicotinic acid produces dramatic improvement within two or three days in doses daily of 5 mgm for a monkey weighing 2 kgm. H S S

AZMY (Solman) The Treatment of Pellagra by Amino Acids. Report of Six Cases from the Post-Graduate Section Faculty of Medicine, Egyptian University—*Jl Trop Med & Hyg* 1938. Nov 15 Vol. 41 No 22. pp 357-362. With 14 figs.

To three patients with pellagra 1 ampoule of larostidine (Roche) was given intramuscularly daily for 22 days to 3 other patients histophan 2 ampoules daily for 22 days. It is stated that in all the rash had disappeared by the 21st day of treatment. In one case in which there was also diarrhoea that was also benefited. All or nearly all were suffering from urinary bilharziasis and ankylostomiasis.

It is suggested that in pellagra there is a deficiency of amino-acids and that in the present series cure was effected by the administration of two of them.

[It would obviously be unwise to make any deductions from the results now reported—the series is so small disappearance of the rash was the only criterion used in evaluating treatment after results are not mentioned and there were apparently no controls.] H S S

SPIES (Tom Douglas) GRANT (Helen M.) & HUFF (Nelwyn E.) The Antipellagric Effect of Certain Pyridine Compounds.—*Southern Med Jl* 1938. Aug Vol. 31 No 8 pp 901-902. [11 refs.]

An article reporting preliminary trials of some seven pyridine derivatives in pellagra from the University of Cincinnati and the Hillman Hospital Birmingham, Alabama.

The following substances were used Picolinic acid alpha and beta picoline trigonelline beta amino pyridine 2-6 dimethyl pyridine and di-nicotinic acid. The fifth and seventh substances had previously been isolated from liver extract by others.

The number of cases submitted to trial were very few and the period of trial very short. The authors however suggest that a number of pyridine derivatives may have a beneficial effect upon pellagrins in relapse. The 3rd 6th and 7th mentioned substances appearing to have some antipellagra effect. H S S

LEWIS (D R.) A Case of Pellagra Successfully Treated with Intravenous Injections of Sodium Thiosulphate.—*Indian Med Gaz* 1938 Oct. Vol. 73 No 10 p 616

The patient a Hindu male 20 years of age came under the author's observation presenting typical symptoms of pellagra rash and discoloration of arms and legs (starting on wrists and ankles two months before) and on the neck, and leukoplakia at the angles of the mouth. His diet was rice and dal. On admission to hospital the diet was left unchanged and the only treatment was injection twice weekly intravenously with 10 cc. of a 10 per cent solution of sodium thiosulphate.

Changes were soon observable—the blackened patches became brown and the brown erythematous and a few days later the pigmentation and erythema disappeared, though the parts first affected—feet ankles and elbows—remained rough. Appetite improved together with a general sense of well-being and “during treatment the patient gained 9 lb in weight. [Nothing is said as to the duration of the treatment.]

H H S

CASTELLANO (Themistocles) & GARRON (Rafael). Dos observaciones sobre pelagra. Consideraciones diagnósticas, etopatogénicas y terapéuticas. [Pellagra. Observations on Diagnosis, Aetiology and Therapeutics.]—*Revista Méd Argentina* 1939 Jan. 25 Vol. 26. No 4 pp 192-219 With 14 figs (18 refs)

BERIBERI

PRÉCIS OF ABSTRACTS IN THIS SECTION

MEYERS (p. 558) describes two tests for the diagnosis of beriberi. The first is the development of or increase in, an audible sound in the cubital fossa after subcutaneous injection of adrenalin. The second and more important is the estimation of diuresis after the fasting patient has drunk 1 litre of water. Both tests should return normal results after the administration of aneurine. He shows (p. 559) that these tests are normal in simple polyneuritis and that the second test may be normal in that form of beriberi which is accompanied by transient oedema. This oedema is due to lowering of the tone of the walls of the arterioles and increased tension in the capillaries. Aneurine cures both oedema and nervous lesions in beriberi and oedema therefore probably has an intrinsic rather than an extrinsic origin.

GARRETT (p. 560) reports a child suffering from polyneuritis and fever who was cured after being given a vitamin B₁ preparation.

TOULLEC (p. 560) recommends the use in the East of rice so decorticated that it retains vitamin B₁ as in the parboiled rice of England and America. A diet for Indo-China containing the necessary 300 I.U. of B₁ is suggested. KIMURA (p. 560) also advises the use of rice from which part of the bran is removed but which retains the embryo. This rice is known as Hलगमल. C II

MEYERS (F M). Clinische onderzoekingen in verband met beriberi. [Clinical Tests for Beriberi].—*Geschied. Tijdschr v Nederl-Indië* 1938 June 28 Vol. 78. No. 26 pp 1537-1550 With 3 figs. [30 refs.] English summary

The heading of this first communication is “Two criteria for the diagnosis of beriberi. They are dependent on insufficiency of the circulatory apparatus and insufficiency of the water metabolism. The first of these criteria is the development of an audible sound in the cubital fossa with subcutaneous inoculation of adrenalin. If, as is frequent in pronounced beriberi, this phenomenon is already present over the large arteries, with in some cases “pistol-shot”

character the adrenalin test is superfluous. In any case adrenal injection should emphasize the phenomenon. The author however considers the second criterion named Volhard's diuresis proof the more important. This test consists in the fasting patient drinking 1 litre of water and a careful record of the diuresis every half hour for 4 hours. By this time or sooner a healthy person should have excreted all the water. Consideration of course must be given to the possibility of loss of water by sweating especially in the tropics. In both tests it is not sufficient simply to have a positive result. The tests must be completed by observing the restoration to normality with administration of aneurine (vitamin B₁). Many conditions with polyneuritis are at the present time regarded as allied to beriberi. It is possible therefore that the differential diagnosis between beriberi polyneuritis and polyneuritis of other—infecting toxic—sorts the question of the primary dry beriberi the question of neuritis or neuralgia and beriberi present popular between types of neuritis or neuralgia and beriberi the existence of a *beriberi sine beriberi* that is of the existence of the positive vascular test and the positive diuresis test in an individual having no symptoms of beriberi may be cleared up by the application of the method of testing here presented

H. F. Harvey

MEYERS (F. M.) *Clinische onderzoekingen in verband met beri-beri. [Clinical Investigations in Connexion with Beriberi.]—Geneesk. Tijdschr. v. Nederl. Indië 1939 Jan 3 Vol. 79 No 1 pp 3-16 [17 refs.] English summary*

The starting point of the above mentioned research is the opinion that an aneurine (vitamin B₁)-deficiency appears specifically under two distinct clinical syndromes: first, as a simple polyneuritis and secondly as a complex syndrome with polyneuritis, edema and disturbances in the function of (the heart and) blood vessels (beriberi). From this point of view investigations have been undertaken, concerning the significance of the edema in beriberi.

In most cases of simple polyneuritis complicating factors precede the nervous lesions—mostly infections. The same is not true for beriberi. Polyneuritis as a rule does not appear to be an early case of beriberi. With a purely anamnestic information it was not possible to discover any difference in dietary insufficiency between the two groups. Thus the distinction between polyneuritis and beriberi seems to be essential, rather than accidental.

In about half of the cases of polyneuritis without edema, heart trouble is also absent and in 92 per cent. of the cases of polyneuritis with edema heart trouble is present (DE LANGEN). Yet it is hardly possible to consider the edema in beriberi as of cardiac origin only.

The vascular syndrome after an injection of adrenaline that is typical for beriberi (AALLENKER) is absent in the majority of polyneuritis cases and VOLHARD'S diuresis test has a normal course in these cases. Meanwhile the last named test may have the same result in beriberi, in which the edema is of a pronounced transient character. These transient edemas represent probably the simplest and purest picture of the beriberi edema. They are of a hydrostatic nature and seem to be caused by a lowering of the tonus of the arteriolar walls and thus by an increased tension in the capillary system.

Thus the problem of the beriberi edema must be concerted into the question of this circulatory failure. It is unknown why this failure appears in only a certain group of cases with aneurine deficiency. But, since

treatment with aneurine cures the edema as well as the nervous lesions, it seems probable that the first has an intrinsic, rather than an extrinsic origin.

[See also WENTKEBACH this *Bulletin* 1935 Vol. 32, p. 79.]

GARRETT (E. B.) Polynuritis with Oedema simulating Beriberi. [Memoranda.]—*Brit Med J* 1938, Aug. 6, p. 287.

The case of a child of 4 years exhibiting polynuritis with fever. The cause was not ascertained, and the child a diet was a normal mixed diet with no indications of vitamin B₁ deficiency. Improvement followed the parenteral administration of Betanin (vitamin B₁), otherwise there is no obvious reason for regarding it as a case of beriberi, and the author clearly recognizes this in the title of his record.

H H S

TOULLEC La prévention du bérubéri. [The Prevention of Beriberi.]—*Rev Méd Française d'Extrême-Orient*, 1938, Feb. Vol. 16, No. 2, pp. 108-119 [Summary appears also in *Bulletin of Hygiene*].

This is a discussion of the conditions leading to the prevalence of beriberi in the East. The chief factors are the very high proportion of carbohydrates in the diet and the low vitamin B₁ intake. It appears to be impossible to persuade the native to use unpolished rice as he objects to the taste and states that it does not satisfy hunger. The author recommends the use of rice decorticated in such a way that the vitamin B₁ is left in the rice. This is done in what is called in America and England "parboiled rice." The increased production and use of vegetables would help to increase the B₁ supply. The daily requirement of B₁ is believed to be about 300 International Units. 100 I U are contained in 200 gm. spinach, white cabbage, carrots, peas, cress, leeks and salads and in 400 gm. potatoes, 160 gm. meat, and in 400 gm. of milk. A diet is suggested which would meet the body's needs and, though difficult to attain, would not be actually impossible in Indo-China.

Douglas C. Harrison

KIMURA (T.) The Problem of abolishing the Use of Highly-milled Rice with Reference to the Merit of "Halgamai" (Rice so milled as to retain Embryo-Bud).—*Jl. Public Health Assoc. Japan* 1938, Aug. Vol. 14, No. 8, pp. 1-8.

The author strongly advises the wider consumption of "Halgamai," i.e., rice which has been milled so that some of the bran which is digested with difficulty is removed but in which the embryo which contains large amounts of vitamin B₁ is left. This rice is more easily digestible and more pleasant to the taste than unpolished or half-milled rice. Because of the prevalence of beriberi and latent B₁ avitaminosis he recommends abolition of consumption of polished rice by legislation, education of rice dealers, urging of authorities responsible for feeding the army and navy etc., to use Halgamai as a means of increasing the B₁ consumption of the people.

Douglas C. Harrison

PALLISTER (R. A.) *Beriberi a Review of Recent Literature.*—*Jl Malaya Branch Brit Med Assoc* 1939. June Vol. 2. No. 1 pp 39-46 [22 refs.]

EGGLETON (William George Elford) *The Zinc Content of Epidermal Structures in Beriberi.*—*Biochem Jl* 1939 April. Vol. 33 No. 4 pp 403-406 With 1 fig [13 refs.]

VENOMS AND ANTIVENENES

PRECIS OF ABSTRACTS IN THIS SECTION

Snakes —JOHNSON (p 563) describes a method for stripping snakes by the application of an electric current which causes contraction of the muscles surrounding the glands.

DURAN REYNALS (p 563) shows that spreading factor is markedly present in venom and that the strength of the factor and the toxicity of the venom are closely correlated.

FELDBERG and KELLAWAY (p 564) record experiments on the action of alcoholic extract of envenomed liver lysocithin and cobra venom which cannot be further abstracted. FELDBERG HOLDEN and KELLAWAY (p 565) show that the close similarity between the effects of lysocithin and those of venoms is explained if the venom causes the formation of lysocithin in certain tissues. Lysocithin is haemolytic its other effects are given in full in the original abstract.

ROY and CHOPRA (p 566) compare the properties of cobra and Russell's viper venoms and ROY (p 566) has investigated their lipolytic actions. There is a close parallelism between the lecithinase activity and haemolysin formation in the presence of lecithin.

VON KLOBUSITZKY and KÖNIG (p 566) regard as haptens the coagulating constituents of the venom of *B jararaca* after separation from their natural binding substances.

CASTELLANI (p 567) from experiments with snakes whose poison glands had been extirpated, and whose blood thereafter showed increasing venom content concludes that venom is a product of tissue metabolism and that one function of the glands is to extract it from the blood.

FABBRI (p 567) obtained good results from the use of cobra venom as an analgesic in 20 patients with various diseases. KELLY (p 568) successfully treated patients with herpes simplex by intradermal injections of the venom of *Ancistrodon piscivorus*.

DE AZEVEDO and TELXEIRA (p 568) regard the diffuse glomerulonephritis with proliferative endarteritis found in a child who died 26 days after being bitten by *B jararaca* as the result of the slow action of the venom, which is excreted by the kidneys.

KELLAWAY (p 568) gives the properties of the venoms of the principal Australian snakes, with symptoms of poisoning and methods of treatment. SCORTECCI (p 570) records the case of a man in Ethiopia who died 7 hours after being bitten by *Dendraspis angusticeps* in spite of immediate ligation of the limb scarification, the introduction of potassium permanganate and, later suction.

Spiders—DOXONOFF (p. 570) shows that an increase in the number of Black Widow spiders found in the raisin vineyards of the San Joaquin Valley has taken place since the introduction of paper trays for the drying of the grapes. The spiders prefer these to the old wooden trays as shelter.

D'AMOUR *et al* (p. 571) found that adult *L. mactans* contain about one lethal dose of venom for immature rats. The venom is probably an albumin and produces a potent antiserum in sheep after continued injection of sublethal doses. In the *Journal of the American Medical Association* (p. 571) emphasis is laid on the late effects of poisoning by *L. mactans*. Paraesthesiae and muscular spasms are not infrequent, but may be in part due to autosuggestion.

Scorpions—SHULOV (p. 571) shows that a scorpion can give six effective stings in a short time. There is a difference between the amount of poison of satiated and hungry scorpions. Various factors of age, nutrition, etc., which influence the power of a sting should be considered in evaluating findings.

WATERMAN (p. 572) records a death rate of 4.7 per cent. in scorpion poisoning, the mortality reaching 25 per cent. in children under 5 years. Death may occur in from 1½ to 42 hours. The symptoms are described and treatment discussed.

MEDULLA (p. 573) gives a list of scorpions of Cirenaica. The symptoms of poisoning by *Buthus bicolor* which persisted for more than three months in one patient, are described. SERGEANT (p. 573) shows that the sting of *Priocnemis australis* in North Africa may be fatal to children and old people. The preparation of antivenene is described and its value demonstrated by records of treated patients.

MONY (p. 574) attributes a syndrome of hemiplegia observed in a child to the sting of a scorpion. BARROS (p. 574) describes the symptoms caused by the sting of the scorpion *T. serrulatus*. In serious cases serum should be given early in 40 cc. dose for adults and 80 cc. dose for children, repeated if necessary.

FLECKER (p. 575) records scorpion sting in five patients in Australia. It appears to be probable that the venom of Australian scorpions is less toxic than that found in other countries, as all these had only slight symptoms.

Tick paralysis—BARRETT (p. 575) describes the symptoms of tick paralysis. The ticks responsible are *D. andersoni* in America and *I. holocyclus* in Australia. Symptoms are those of ataxia and muscular weakness leading to respiratory paralysis, and suggest a lesion of the anterior cornu, but recovery usually takes place rapidly on removing the tick. It is suggested that the tick produces excessive egg venom and excretes it by the over-active salivary glands. GIBBS (p. 576) describes a case and arrives at similar conclusions. MAIL (p. 577) shows that over 150 cases have been recorded and that sheep, cattle and horses are attacked. He agrees that *D. andersoni* is chiefly responsible. ROBINSON and CARROLL (p. 577) show that *D. variabilis* is also capable of causing the disease and describe a case from Georgia, U.S.A.

Ants—WEBER (p. 578) records the intense local reaction he experienced as a result of being stung by the ant *Paraponera clavata* Fabr. Vesiculation occurred with intense pain and temporary paralysis of the limb. It is said that multiple stings may prove fatal to man.

SABINO (Santos Carrasquel) Notas sobre ophidismo [Notes on Herpetology]—*Brasil Medico* 1938. Oct. 22. Vol. 52 No 43 pp 962-971 With 5 figs & 8 photos. [15 refs.]

This is a brief sketch of snakes pointing out some of the distinctions in the skull and teeth formation between poisonous and non poisonous snakes, and describing some of the latter and methods of catching them for obtaining venom together with a few remarks on indications for treatment.
H H S

BOURRET (René) Les serpents venimeux en Indochine. [Venomous Snakes of Indo-China.]—*Rec Méd Française d'Extrême-Orient* 1938. May Vol. 18 No 5 pp 485-487 With 12 figs.

This is a brief account of the common venomous snakes of Indo-China. The snakes are described and shown in illustrations and mention is made of the action of the venoms and of the treatments usually adopted. No new work is recorded and the article cannot satisfactorily be abstracted but is a useful guide to the subject.
C IV

PASQUAL (J R. H.) Field Guide to the Commoner Colubridae and Viperidae—*West African Med J* 1938. Oct. Vol. 10 No 1 pp 38-39

JOHNSON (Carl M.) A New Method for stripping Venomous Snakes.—*Amer J Trop Med* 1938. July Vol. 18 No 4 pp 385-396

The usual method of manual manipulation for the evacuation of the venom glands is often accompanied by injury which interferes with subsequent function. Contraction of the muscles surrounding the glands can be obtained by the application of the active electrode of a five to ten volt induced current to the side of the head behind the eye and of the indifferent electrode to any part of the body. The exact position of the active electrode must be determined by experiment but in certain snakes a point about midway between the eye and the back of the head at the upper limit of the upper labials is the best. The active electrode is a wooden handle into which is inserted a piece of glass tubing carrying a copper wire which is looped at the end and covered with several thicknesses of gauze. The indifferent electrode consists of coiled wire inserted into a sponge.

The interval between such venom extractions should be not less than two weeks.
C IV

DURAN REYNALS (F.) Content in Spreading Factor and Toxins in Organs and Poisonous Secretions of Snakes.—*Proc Soc Exper Biol & Med* 1938. June Vol. 38. No 5 pp 763-766

The spreading factor though it exists in practically all mammalian tissues as well as in those from other zoological groups is most active in cell secretions. Therefore the living cells may only be potential sources of the factor the activity of which does not become manifest until the secretion itself has undergone some change.

The potency of the spreading factor in venom, blood serum and tissue extracts was determined in four poisonous and two non poisonous species of snakes. In three of the experiments with poisonous snakes

the venom gland was cut and thoroughly washed before extraction to remove all traces of the secreted venom. The venoma, sera and tissue extracts were mixed with India ink a control of saline and India ink was used, and a mixture of the venom, etc. with saline in place of the ink served to show the severity of the lesions uncomplicated by the ink. The table of results shows that the factor is only present in the washed glands in the same proportion as in the other tissues. It is markedly present in the venom and there is a close correlation between the strength of the factor and the toxicity of the venom. Both the factor and the venom are therefore products rather than components of the gland cells. The serum of snakes shows some activity while that of mammals is practically inactive [See also CASTELLANI below]

C II

FELDBERG (W) & KELLAWAY (C H) Liberation of Histamine and Formation of Lysocithin-like Substances by Cobra Venom.—*Jl Physiology* 1938, Nov 14 Vol 94 No. 2, pp 187-226. With 30 figs. [22 refs.]

Cobra venom contains a lecithinase which splits off oleic acid from lecithin. The remaining portion, lysocithin, is powerfully haemolytic. Crude lysocithin was prepared by the action of cobra venom on egg lecithin and this, without any attempt to prepare pure lysocithin was used in the experiments, of which full details are given. The conclusions cannot be better expressed than in the authors own words —

"1 The injection of cobra venom (3-20 mg) into perfused organs (lung, liver) of dogs and monkeys causes the appearance in the venous perfusate of histamine or protein and of a substance or substances which cause slow contraction and transient changes in the excitability of the guinea pig's gut. In the case of the liver pigments are also set free. No histamine appears in the perfusate of envenomed monkey's liver since this organ has a very low histamine content. The changes in the venous perfusate from the liver of dogs poisoned by intravenous injections of cobra venom are similar to those observed when the venom is injected into the isolated organ.

2 Histamine protein and liver pigments are *liberated* from the cells of perfused organs, but the substance (or substances) which causes slow contraction of the gut and subsequent changes in its reactivity is *formed* in the organs by the action of the venom.

3 This substance is present in large amounts in extracts of envenomed organs. It is soluble in absolute methyl alcohol and heat stable. Pharmacological actions of alcoholic extract of envenomed monkey's liver ('envenomed liver') have been compared with those of cobra venom and of extract of lecithin treated with venom ('lysocithin').

4 Envenomed liver and lysocithin cause slow delayed contraction of the guinea pig's jejunum and characteristic after-changes in reactivity to histamine and to acetylcholine. The effects of cobra venom are similar but in this case the muscle is readily desensitized.

5 Envenomed liver, lysocithin and cobra venom contract the rat's jejunum, the normal guinea pig's uterus and the uterus poisoned by histamine. In the case of cobra venom the preparations are readily desensitized.

"6. On the isolated cat's heart, lysocithin causes changes in coronary circulation and strong reduction in the force of the beat. rapid failure occurs and the heart ceases to beat in diastole or in mid-position. Extracts of normal monkey's liver which by themselves have no action, protect

from the action of lysocithin and if the protection is not complete a gradual failure occurs similar to that caused by envenomed liver. Cobra venom (2-4 mg) causes rapid failure and systolic contracture of the heart.

7 Injected into the anterior chamber of the rabbit's eye envenomed liver lysocithin and cobra venom cause opacity of the cornea and irregular alterations of its curvature. Extracts of normal monkey's liver are without effect.

8 Injected intravenously into guinea pigs envenomed liver and lysocithin cause symptoms resembling acute anaphylactic shock with the addition of haemorrhagic oedema of the lungs.

9 Washed sheep's red corpuscles are immediately haemolysed by envenomed liver and lysocithin but not by cobra venom nor by extract of normal monkey's liver. The latter has a protective action against haemolysis by lysocithin.

10 Envenomed liver and lysocithin injected into the perfused dog's liver cause output of protein, histamine and pigments. With repeated injections the output of histamine increases. These effects are closely similar to those produced by repeated injections of small doses of cobra venom.

C H

FELDBERG (W) HOLDEV (H F) & KELLAWAY (C H) The Formation of Lysocithin and of a Muscle-stimulating Substance by Snake Venoms.—*Jl Physiology* 1938 Vol 14 Vol 94 No 2. pp 232-248. With 11 figs.

In this paper the authors record investigations on the pharmacological activity of purified lysocithin. The previous paper (see above) dealt with the crude substance.

Lysocithin is haemolytic in concentrations up to 1 in 6400 but has no action on guinea pig's gut. It

causes decreased excitability of the isolated jejunum and contraction of the uterus of the guinea pig, opacity of the cornea if injected into the anterior chamber of the rabbit's eye and haemorrhagic oedema of the lung when injected intravenously into the intact guinea pig. It causes the liberation of protein pigments and histamine from the perfused liver of the dog and of protein and pigments from the perfused liver of the monkey. In the cat and dog it causes a steep fall of systemic blood pressure which in the former is associated with a rise of pressure in the pulmonary artery and haemorrhagic oedema of the lung and in the latter with a rise of pressure in the portal vein. Injected into the femoral artery of the dog it causes evanescent vasodilatation. These effects resemble those produced by venoms.

Lysocithin and a gut stimulating substance are formed by the action of venom on lymph egg yolk or lecithin *in vitro* and also in the tissues by the action of venom on perfused organs. The mode of formation of the gut stimulating substance is unknown.

The close similarity between the effects of lysocithin and those of venoms is easily explained if the venom causes the formation of lysocithin which in some instances acts not only alone but also by the liberation of histamine. No desensitization occurs against the action of lysocithin. Desensitization against venom therefore must be accounted for by failure to produce further lysocithin in response to a second dose of venom.

No investigation was made as to whether or not lysocithin plays a part in producing neurotoxic manifestations.

C H

ROY (A. C.) & CHOPRA (R. N.) Some Biochemical Characteristics of Snake Venom.—*Indian Jl Med Res.* 1938. July Vol. 26 No 1 pp 241-248.

A comparative examination of cobra and Russell's viper venoms showed that the former contains less albumin and more pseudoglobulin than the latter but has no englobulin which is present in the viper venom. Neither shows diastatic action or the capability of inverting saccharose. Both digest fibrin, liquefy gelatine, clot milk and digest casein, but the viper venom appears to be more active than the cobra venom in proteolytic action. Lipolytic action could not be determined on account of the faulty technique employed. Cobra venom is haemolytic in varying degrees for the susceptible species of erythrocytes but viper venom is non-haemolytic in the large majority of cases.

C IV

ROY (A. C.) Lipolytic Activity of the Venoms (Cobra and Russell's Viper).—*Indian Jl Med Res.* 1938. July Vol. 26. No 1 pp 249-257 11 refs.]

The lipolytic action of cobra and viper venom which was not determined in the work of ROY and CHOPRA above is reported in this paper. Neither venom has any action on an emulsion of olive oil, but cobra venom acts energetically on ethyl butyrate. The esterase and haemolytic activities, however are not parallel since the former is destroyed by heating the venom to 58°C. for half an hour while the latter is not appreciably affected. Both venoms act on lecithin by splitting up fatty acids, but the viper venom appears to have the stronger action. The venom lecithinase is very stable even to boiling for 15 to 20 minutes, but autoclaving entirely destroys it.

There is a close parallelism between the lecithinase activity and haemolysin formation in the presence of lecithin. With an emulsion of cholesteryl oleate, cobra venom showed appreciable lysis of the emulsion, and viper venom a flocculation but neither could split up the emulsion.

C IV

VON KLOBISITZKY (D.) & KÖNIG (P.) Novos estudos immunologicos sobre a substancia coagulante do veneno de *Bothrops jararaca*. [New Immunological Studies on the Coagulating Substance of the Venom of *Bothrops jararaca*].—*Mem Inst Butantan* 1937 Vol. 11 pp 149-181 English summary

Two sera obtained from goats immunized with a solution of *Bothrops jararaca* venom previously purified by means of fractionation and adsorption with $\text{Cr}(\text{OH})_3$, showed a certain capacity of fixation although the purified antigen used possessed a higher coagulating power and a lower neurotoxic activity than the original poison.—

1. They neutralized more completely both the neurotoxic constituents of the natural poison (*Bothrops jararaca*) and the coagulating fraction extracted from it than its original coagulating activity.

2. They failed to neutralize the original coagulating activity of the rattlesnake poison (*Crotalus terrificus*).

In the light of these findings it seems that the coagulating constituents of those snake poisons, after separation from their natural binding substances, should be considered as haptens.

CASTELLANI (Giovanni Tarabini) II Nota sullo studio dei rapporti fra la tossicità del sangue in toto di *Vipera aspis* e quella della secrezione ghiandolare del veleno [The Resemblance between the Toxicity of Whole Blood and Poison Gland Secretion in *Vipera aspis*].—*Arch Ital Sci Med Colon e Parassit* 1938 Apr Vol. 19 No 4 pp 223-228

The author quotes the findings of PRISALIN and BERTRAND who considered that the venom of *Vipera aspis* is formed by some kind of internal secretory mechanism, and who found that the toxicity of the whole blood after extirpation of the poison glands was diminished for a period of one to two months after which it slowly returned to normal. With this finding the author's present work does not agree.

Using for his experiments specimens of *V. aspis* which were (unavoidably) in bad condition he extirpated the poison glands of a number of which 8 lived long enough to be of use (10 to 18 days). Eight others with glands left intact were used as controls. Whole blood was withdrawn from all these and dilutions with 0.9 per cent NaCl were made as follows —

	I	II	III	IV	V	VI
0.9 per cent. NaCl	0	0.167	0.278	0.348	0.393	0.433
Whole blood	0.5	0.333	0.222	0.152	0.107	0.067

Mice of 18 gm weight were inoculated intraperitoneally with 0.5 cc. of these dilutions. All the mice inoculated with I and II from both gland-extirpated and control snakes died within 16 hours but whereas all mice in the extirpated group inoculated with III died only 2 of the controls died (within 25 hours). Signs of intoxication were found with IV and V and in the extirpated group in 13 cases but only in 8 cases in the control group. The remaining mice were unharmed.

It was also seen that the blood of snakes whose glands had been extirpated 18 days before the experiment was more toxic than that of the 12 day snake. A longer period than 18 days was impossible on account of the bad condition of the snakes.

The author therefore concludes that after extirpation of the glands an increase in the toxicity of the blood is evident on the 12th day and more evident still on the 18th day. He concludes that venom is a product of tissue metabolism and that one function of the poison glands is to extract it from the blood. He does not claim this experiment to be a final proof but thinks the results might be even more striking in a warm climate using snakes which are in good condition. C W

FABRI (Giuseppe) Azione terapeutica del veleno di cobra. [Therapeutic Uses of Cobra Venom].—*Polisimico Sez. Med.* 1938 May 1 Vol 45 No 5 pp 256-268

Snake venom has been employed for haemophilia for haemorrhage after dental extraction and for epistaxis and also for neuralgias and other painful conditions such as cancer tabetic crises leprosy rheumatism and for epilepsy. Good reports have been issued under each of these headings but the venom used has generally been that of Daboia (*Vipera russellii*).

The author of this article has employed cobra venom [he does not mention the species] a colubrine and gives brief details of twenty patients six of nerve-root affection five of carcinoma (three of stomach and one each of uterus and rectum) two of sciatica, two of trigeminal neuralgia, and one each of five other conditions four neuralgias and one tabes. He started by injecting 1/25 mgm. and after three or four doses in the course of 10-14 days, increased to 1/10 mgm. In nearly every case much relief was obtained from 7-8 injections and in some even earlier. There were no indications of the toxin being cumulative and in the author's hands it proved a very serviceable analgesic. [The method of employment the site of injection etc. are not stated.] H H S

KELLY (Richard J.) Treatment of Herpes Simplex with Moccasin Venom.—*Arch Dermat & Syph* 1938. Oct. Vol 38. No 4 pp 599-602.

Fifteen patients with herpes simplex were treated, when possible in the incipient stage with moccasin [*Anacardion parvum*] venom by intradermal doses of 0.2 cc. of a 1 in 3 000 dilution. In some cases one injection was enough but one patient was given two injections on successive days. The symptoms were usually relieved and the course of the eruption materially shortened and the number of recurrences appears to have been decreased. Three patients with herpes zoster reported relief of symptoms following this treatment but the course of the disease appeared to be unaltered.

Attempts to influence the virus directly by the use of moccasin venom 1 in 3 000 dilution in experiments on rabbits were unsuccessful. [See also this *Bulletin* 1936 Vol 33 p 394.] C II

DE AZEVEDO (A. Penna) & TEIXEIRA (J. de Castro) Intoxicação por veneno de cobra. Necrose symetrica da cortex renal. Uremia. [Poisoning by Cobra Venom. Symmetrical Necrosis of the Renal Cortex.]—*Mem Inst Oswaldo Cruz* 1938 Vol 33. No 1 pp 23-37 With 8 plates [10 refs.] English summary

A child of 15 was bitten by *Bothrops jararaca* on the leg and died 28 days later. The principal pathological changes were found in the kidneys and consisted of diffuse glomerulo-nephritis and symmetrical cortical necrosis. Proliferative endarteritis was present and probably accounted for the necrosis. The endarteritis was progressive but was not accompanied by thromboses.

The authors consider that the renal changes were the result of the slow and prolonged action of the venom which is eliminated by the kidneys. The blood showed haemoglobin down to 11 per cent. and red cells to 960 000. Renal insufficiency was shown by increase in the blood nitrogen, creatinin, inorganic phosphorus and indican, but the patient did not present the clinical evidence of azotaemic nephritis. C II

KELLAWAY (C. H.) The Symptomatology and Treatment of the Bites of Australian Snakes.—*Med J Australia* 1938 Oct. 8 25th Year Vol 2. No 15. pp 585-589

From the descriptions given by the author the pharmacological properties of the venoms of Australian snakes may be shown in general terms as a table [constructed from the text by the reviewer] —

	Neurotoxic	Haemolytic and cytolytic	Coagulant
<i>Notechis scutatus</i> (Tiger snake)	+++	+	+++
<i>Acanthophis antarcticus</i> (Death adder)	+++	+	0
<i>Demisonia superba</i> (Copperhead)	+++	+++	0
<i>Demansia textilis</i> (Common brown snake)	+++		+++
<i>Pseudechis porphyriacus</i>	+	+++	+++
<i>Oxyuranus scutellatus</i>	+++	+	++
Snakes of genus <i>Hoplocephalus</i>	+++	+	

Neurotoxic action is a paralysis of both sensory and motor nerve endings but there is also a possible central action. The haemolytic and cytolytic action results in the liberation of histamine and causes symptoms of cardio-vascular failure. The coagulant action causes intravascular clotting and if in large doses may do so in the inferior vena cava and the portal and mesenteric veins with death in a few minutes.

The symptoms of onset may occur in 15 minutes to 2 hours and are usually nausea vomiting faintness and drowsiness. Symptoms of neurotoxic origin are incoordination blunted sensation paresis of various muscles including the tongue and diaphragm, and coma. General features may include albuminuria and haemorrhages the latter due to coagulant venom.

Symptoms may appear relatively slowly so that death usually takes place at about 48 hours after the bite but if the venom is injected into a vein or if a large amount is injected death may occur in a few minutes. A feature of bites by brown snakes is that sometimes there is a long period of freedom from symptoms after the first 24 hours with death from respiratory failure 36 or 48 hours or more after the bite.

Treatment, If a limb is bitten consists of immediate ligature proximal to the bite to stop arterial flow of that portion of the limb which contains only one bone. The bite should be washed immediately with saliva or urine if necessary. Excision or cutting should be performed but are only valuable in the first few minutes. The flow of blood can be assisted by suction and should be encouraged by occasional release of the arterial ligature after a venous ligature has been applied in addition to prevent entry of venom into the general circulation. Local venesection may be performed, using the two ligatures but is only valuable if an efficient arterial ligature was applied at once.

Monovalent tiger snake antivenene is useful but has no action in brown snake or death adder bites. The dose is 60-100 cc. intravenously. It is wise to perform an intradermal test with 0.1 cc. and if there is any reaction desensitization should be performed as follows: 0.025 cc. subcutaneously one hour later 0.1 cc. subcutaneously one hour later 1.0 cc. subcutaneously one hour later 0.1 cc. intravenously. If the last does not cause allergic symptoms the full dose diluted to 1 in 5 should be given slowly at body temperature into a vein. Treatment of allergic symptoms is by immediate cessation of the serum injection and the administration of atropine or adrenalin.

The patient should be kept at rest and given black coffee or possibly strychnine. C W

SCORTECCI (Giuseppe) I "Mamba" dell'Africa Orientale Italiana [The "Mamba" in Italian East Africa.]—*Riv di Biol Colon* Rome. 1938. Apr. Vol. 1 No. 2. pp 81-90 With 2 fig English summary (6 lines)

The author gives a brief account of the "mamba" *Dendraspis*, a deadly snake met with in Ethiopia (and elsewhere in Africa). There are two species at least, the green and the black, but both are here called *Dendraspis angusticeps*. An instance is detailed which illustrates the potency of its venom. One of a hunting party, a man (21 years of fine physique and unusually robust) was bitten on the foot by a mamba at 3 p.m. Assisted by one of his companions ligatures were applied immediately, one above and one below the site of the bite [the actual location of the wound is not stated, hence we do not know how a ligature was applied below a wound of the foot], the wound was scarified and crystals of potassium permanganate introduced. A little later another ligature was applied above the knee and a fourth to the thigh. On arrival at camp the man was put to bed, suction applied to the wound and stimulants given. For a time his condition appeared to be satisfactory, then diarrhoea set in with spasmodic contractions of the muscles of the throat. By 9 p.m. he was unable to speak and at 10 p.m. died from respiratory paralysis "the poison reaching the respiratory centre." In spite of prompt application of tourniquets and local treatment, a healthy robust adult was killed in 7 hours. A plea is made for inclusion of antivenene for *Dendraspis* in the sera for Naja, Bitis, Echis and other local snakes. H H S

PHISALEX L'immunité naturelle des espèces venimeuses et ses mécanismes [Natural Immunity of Venomous Species and its Mechanism.]—*Bull Acad Afric* 1938 May 3 102nd Year 3rd Ser No 119 No 17 pp 464-474

DONOHUE (Heber C) Notes on the Black Widow Spider in the San Joaquin Valley [Research Notes.]—*Jl Parasitology* 1937 Aug Vol 23 No 4 p 424

This is an interesting explanation of the recent increase, apparently certainly and actual probably of *Latrodectus mactans* in the San Joaquin Valley, California, especially in and about farm buildings in raisin vineyards. The grapes used to be dried on wooden trays, stacked in piles, but of late these have been replaced by folded paper trays left on the ground. These are a favoured shelter for the Black Widow spider which thrives on the larvae of the raisin moth *Ephestia figulidella* which enters the trays in numbers for egg-laying, and the trays of folded paper offer better concealment for the spider than do the wooden trays. In 1933 no spiders were found in 200 wooden trays in two places but 29 in 1 100 paper trays from ten different crops. Some 36 million papers were used altogether so that it is estimated that there were about 836 000 of these spiders and in many trays webs were found but no spiders, these having probably escaped during the handling of the trays. Further raisins from wooden trays are found in the vineyards, whereas a large proportion of the paper

trays are hauled to the farmyards for boxing and the spiders enter outbuildings wood piles and other shelters and so are found in increasing numbers in and about the farm buildings H H S

D AMOUR (Fred E.) BECKER (Frances E.) & VAN RIVER (Walker)
The Black Widow Spider—*Quart Rev Biol* 1937 Vol. 11
No 2. pp 123-160 With 5 figs. [Summarized in *Biol Abstracts* 1937 Aug-Oct Vol. 11 No 7 p 1872.]

Numerous observations on the natural history of the black widow spider (*Latrodectus mactans*) including distribution habitat, temperament, reproduction development, and means of dispersal. Plates show the sex differences and several stages in the development of the ♀. The second part of the paper is devoted to a study of the venom, its toxicity and chemistry and of the development of immunity toward it. Similar studies were made of the toxic substance of the eggs. Finally assays of the hyper immune sheep serum produced by the E. R. Squibb and Sons Company are recorded. The more important experimental results are summarized. The average lethal dose for immature rats is 0.32 mg. of dried venom which is about $\frac{1}{4}$ the amount present in an adult ♀ spider. Chemical evidence indicates that the venom is a protein, probably an albumen. Injection of sub-lethal doses over a period of time into rats or sheep gives a potent anti-serum, about 25 A.L.D. of venom being neutralized per c.c. None of the antidotes studied was effective. No pathologic abnormalities in rats kept chronically intoxicated could be discovered. About 6500 spiders and 500 rats were used in this investigation.

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION 1937 July 31
Vol. 109 No 5 p 331—Black Widow Spider Bite [Queries
& Minor Notes.]

The symptoms of poisoning from the bite of the Black Widow spider *Latrodectus mactans* may be very severe [see this *Bulletin* 1936 Vol. 33 pp 401-403]. The question of late effects however has not often come under discussion. The author of this note mentions the case of a man of 35 years who was bitten and presented the usual symptoms but was not recovered sufficiently to cease treatment by his physician for four weeks. Although six months had elapsed since the bite was inflicted the patient still complains of cramps in the arms and abdominal muscles and of a degree of weakness which prevents him working. Paraesthesiae numbness tingling and transient muscle spasms are not infrequent sequelae of spider-bite but recovery is usually complete and the severity of these after effects appears to depend not a little upon the autosuggestibility of the subject.

H H S

SHULOV (A.) On the Poison of Scorpions in Palestine.—*Harefuah*
1938 July-Aug Vol. 15 No 1-2. [In Hebrew English
summary pp 1-2.]

Experiments with scorpions and with extracts of their stings led to the following conclusions —

1. Of the five species experimented with, *Buthus 5-striatus* is the most poisonous. The degree of venom of the other species falls gradually in the following order: *Prionurus bicolor* Nebo *Buthus judaicus*, *Scorpio maurus*.

* 2. Of the five ages of *Buthus 5-striatus* which were experimented with, the three older ones are the most poisonous. The degree of venom of the two younger ages, up to the length of about 2.5 cm. reaches, according to its influence, half of that of the older ones. The analysis of the contents of the gland showed that the amount of venom of the youngest ages is $\frac{1}{3}$ of that of the older ones.

3. Comparative experiments made as to the variability of the influence of the venom during the various hours of the day in different temperatures and seasons showed that there are no differences in the degree of influence in a temperature of 10°C . and above neither in the different hours of the day nor in the various seasons. It was established that under the conditions of this country there is no interruption of activity in the winter and the multiplication of the scorpions is not connected with any season in particular.

4. The estimation of the effective amount of poison excreted from the gland at the same time of the day and season showed that the scorpion, be it even the youngest, can give 6 effective stings, following which the poison becomes weaker, probably due to reduction taking place in the concentration of the excreted poison. There is quite a difference in the amount of poison, both in the gland and as estimated from the bites, of satiated and hungry scorpions.

* 5. The factors effecting a change in the degree of venom depending on the scorpion are very numerous and the following were established with certainty: the species of the scorpion, its age, its state of nutrition, the number of stings it has stung a short time preceding the experiment, the state of the tip of the sting.

"The conditions depending on the animal experimented with are the toughness of the skin at the spot it was stung, whether the body is hairy or not, the proximity of blood vessels to the bitten spot, the general health conditions (perhaps also a special constitution).

"All the above named factors are bound to make the influence of the sting very manifold and also give rise to contradictory opinions originating from unlike individual experiments.

WATERMAN (James A.) Some Notes on Scorpion Poisoning in Trinidad.—*Trans Roy Soc Trop Med & Hyg* 1933. Apr 20 Vol. 31 No 6 pp 607-624 [14 refs.]

The incidence of poisoning by scorpions in Trinidad is uncertain because only severe cases come under medical observation. Most occur between Couva and Siparia in the cane-fields of the south or the cocoa plantations of the north-east: they often lurk in shoes and clothing. In the five years, 1929-33 there were at one hospital in a cane-growing district 698 cases admitted, 189 in the last year and 33 deaths or 4.7 per cent. 13 of them in the last year. The fatality rate as one would expect is greatest in the very young: of 16 under one year six died, and up to the age of 5 years (83 cases, 22 deaths) the rate was 25 per cent. between 6 and 10 years (96 cases, 5 deaths) 5.2 per cent. in the second decade 5 fatal among 190 cases or 2.6 per cent. of 324 over 21 years of age only one died. Death might take place at any interval from $1\frac{1}{2}$ to 42 hours.

The symptoms are burning pain, usually lessening in 15 minutes; the patient feels sick and presents salivation, nausea and vomiting with profuse sweating. The vomit may be dark coffee-ground in colour. Respirations may be as rapid as the pulse, but though there is dyspnoea there is never cyanosis. Reflexes are increased. In infants and children convulsions are common and in such cases the prognosis is bad. In half the cases there is glycosuria.

Excretion may occur in poisonous amount in the milk and the author refers to the case of a woman being stung shortly before nursing her child. The latter showed symptoms of scorpion poisoning and died. A similar condition has been recorded after snake-bite.

At autopsy all the viscera are congested the lungs are oedematous (due probably to cardiac failure) and small subserous and submucous haemorrhages are visible. The pancreas may show haemorrhages and pancreatic cyst has been found at intervals of varied length afterwards.

Treatment used to be by potassium permanganate intravenously but this has been given up. Some now give 2 cc of 0.25 per cent. colloidal manganese intramuscularly repeated if necessary and have reported good effects. Others give glucose 10 per cent rectally or 3 per cent subcutaneously followed by insulin. Treatment otherwise is symptomatic. Brief details of eight cases are recorded.

H H S

MEDULLA (Candido) Sugli avvelenamenti da puntura di scorpione in Cirenaica [Scorpion Poisoning in Cirenaica.]—*Arch Ital Sci Med Colon e Parassiti* 1937 Aug Vol 18 No 8, pp 483-493 With 2 figs.

The chief value of this article is the list of scorpions found in Cirenaica. Introductory to this is an account of a soldier aged 48—from the clinical history an "old soldier"—who was stung on the back of the right hand and the arm. He first felt a slight prick on the hand and soon after a more severe one on the arm and taking off his coat he found in the sleeve two scorpions a dark-coloured one 4 cm. in length and a light grey one 3 cm. both proved to be *Buthus bicolor*. He suffered from pain and inflammation in the arm and the larger joints and had fever between 38.5 and 39°C. he remained in bed for about a month. The inflammatory signs disappeared with the fall of temperature to normal but the pains in the muscles and joints persisted and after 96 days more or less confined to bed he was transferred to another hospital where after a few days of atophan by mouth with daily massage the pains disappeared.

The scorpions listed by ZAVATTARI as found in Cirenaica and Tripolitania are 17 in number viz —

BUTHIDAE *B. occitanus tunetanus* *B. bageux* *B. quinqueserialis* *B. aculeocarinatus klaproxi* *B. australis australis* *B. a. amorenxi* *B. a. lybicus* *B. a. priamus* *B. bicolor bicolor* *B. b. arneus* *B. b. longecarinatus* *B. syriacus* and *B. leptochelys*

SCORPIONIDAE *S. manus tunetanus* *S. m. palmatus*

CHACTIDAE *Euscorpius carpathicus* and *Orthochirus innesi*

H H S

SERGEANT (Etienne) Sérum antiscorpionique. (Note préliminaire.) [Scorpion Antivenene.]—*Bull Acad Méd* 1938, Mar 1 102nd Year 3rd Ser Vol. 119 No 9 pp 254-257

Priornus australis is the dangerous species of scorpion in Northern Africa and during the hot season its sting has proved fatal to children and the aged. The symptoms produced are severe pain at first localized, later extending vomiting, vertigo sweating, dyspnoea cardiac disturbance coma and death when it occurs in 2-24 hours.

The antivenene is prepared by injecting the poison from 100 mixed glands as the toxin content varies in different scorpions. The fatal dose for a mouse of 20 gm is 1/40 of a gland or half a drop of an emulsion of 100 glands in 100 cc. physiological saline. For injection of horses cholesterin 12.5 gm. per 100 cc. is added and just before injection $HgCl_2$ 1 in 1,000 1 cc. for each 10 cc. of the emulsion. The initial dose is 1 cc. increasing at first weekly later fortnightly to 30 glands (a maximum of 60 has been attained). To the final antivenene 1 cc. commercial formalin is added to 3 litres serum ampoules are heated to 55°C. for 45 minutes.

A good antivenene will protect 75 per cent of mice injected with a lethal dose and then elsewhere with 10 drops of the serum. *P. australis* antivenene protects also against *Buthus occiduus* and *Pr. Liouvillei* (the black scorpion) both North African scorpions.

The antivenene was used in 33 patients (19 children 1 old man and 13 adults) seriously ill and thought to be dying. 28 recovered and 7 died (6 children and 1 adult). In the case of 8 others (7 children 1 old man) seriously ill, but in whom a fatal issue might be expected from the species of scorpion and the age of the patient all recovered that is, out of 41 cases 34 ended in recovery 82.9 per cent. Sixty-six who showed symptoms—pain vomiting, sweats and chills—but not dangerous, all recovered.

H H S

MODY (S H.) Aphasia and Complete Right Hemiplegia after Scorpion Bite.—*Indian Med Gaz* 1938 May Vol 73 No 5 p 285

The author records a case of aphasia with supranuclear right facial paralysis and right hemiplegia in a boy aged 11 at Poona. The condition originated five days after the patient had been struck by a scorpion and no other lesion could be found which would account for it. The author therefore attributes the paralysis to the action of the venom, perhaps through the formation of an embolus of agglutinated red blood corpuscles.

C IV

BARROS (Evandro F.) O quadro clinico da intoxicação escorpionica [Symptoms of Scorpion Sting].—*Hospital* Rio de Janeiro 1938. Aug & Sept Vol 14 Nos 2 & 3 pp 317-330 581-593 [24 refs.]

The species of scorpion dealt with in this long article is *T. serrulatus*. The author divides cases into mild and severe. The former present symptoms of local pain and numbness, hyperaemia and oedema and systemic disturbance with sweating agitation headache vertigo and tachycardia. In severe cases these are all present but aggravated, with vomiting and passage of urine and faeces, and disordered respiration. Each of these symptoms is described fully and discussed in detail as to its pathogeny in the present article. The systemic and distally produced symptoms come on in severe cases within two hours. Mild cases do not need serum but in the more serious, if the toxic symptoms are marked and two hours or more have elapsed at least 40 cc. of antivenene should be injected intravenously and this should be repeated if there is no definite improvement in another hour. After a further hour if the amelioration is not marked, 20-30 cc. should be given intramuscularly or intravenously and so on from hour to hour. If the patient is a child under ten years of age the initial doses are doubled 80 cc. intravenously for the first and, if needed,

the second and subsequently 20-30 cc. Even after there is apparent recovery the patient should be kept under observation for at least twelve hours in case there should be any relapse or return of symptoms. Though the symptoms may be so serious as to threaten the life of the patient the fatality rate if the poison is ever fatal to man is not stated. The antivenene referred to is that prepared at the Ezequiel Dias Biological Institute the potency being such that each cc contains 4-6 m.l.d. for the camandongo (Brazilian house-rat)

H H S

DE MAGALHÃES (Otávio) Escorpionismo [Scorpion Poisoning].—*Hospital Rio de Janeiro*. 1938 Mar Vol 13 No 3 pp 421-426 With 2 figs.

FLECKER (H) Injuries caused by Australian Scorpions.—*Med J Australia* 1937 June 5 24th Year Vol 1 No 23 pp 875-876

Three genera of scorpions occur in Australia namely *Urodacus* of a size up to 120 mm. *Buthidae* and *Bothriuridae* under 45 mm. *Lychas marmoratus* and *Isometrus maculatus* are species of the last. Practitioners in Tropical Queensland have been asked to report all cases of injury by scorpions trivial as well as severe to the Registrar Cairns.

Five cases are reported in this paper (1) A child of 5 years stung on the sole of her foot by *Urodacus spinatus* suffered from a sharp stinging feeling lasting for two hours the parents were more upset than the child. Reference is made to a case reported in 1924 of a sting by *U. novae-hollandiae* producing a very bad swollen finger (2) A man of 38 years stung on the foot by *Lychas marmoratus* the result was swelling and induration for 12 hours, with a feeling of nausea and a pulse rate of 100 per minute but no other indications of systemic disturbance. Three cases of sting by *Isometrus maculatus* (3) man of 28 years stung on the foot. There was severe pain lasting about a minute followed by a burning sensation not very severe for at least another half hour and a swelling 15 mm. in diameter (4) A man of 25 years stung on the calf pain severe for 15 minutes over the whole calf but passing off in two hours. (5) A woman of 49 years stung on the right index finger pain spread to the shoulder and lasted for at least three hours. In none of these last three patients were there any constitutional symptoms. Unless only a small amount of venom happened to be injected and that is hardly likely in all these cases the toxicity of scorpion venom in these Australian species would appear to be less than in other countries e.g. in Brazil where the sting of *Tityus serrulatus* may be fatal [see this *Bulletin* 1936 Vol. 33 p 399 and J. A. WATERMAN above]

H H S

BARNETT (E. J.) Wood Tick Paralysis in Children.—*Jl Amer Med Assoc* 1937 Sept. 11 Vol. 109 No 11 pp 846-848

Wood tick paralysis in children though acute, is usually afebrile. The child awakens in the morning feeling quite well but collapses on attempting to stand the gait is ataxic when efforts at walking are made and in a few hours walking and even standing are impossible owing to progressive muscular weakness of the legs, and self feeding

owing to ataxia of the arms. The offending tick has usually been feeding for 5 or 6 days and is found engorged on any part of the body. If not found and removed death may occur from respiratory paralysis; if removed recovery is rapid and usually complete in 48 hours. The condition has been reported from Montana, Oregon, Wyoming, Idaho and Washington States, and also from British Columbia and Australia. Although the disease is recorded in five States only the tick is found over a range of thirteen States. In the Rocky Mountain area the wood tick is *Dermacentor andersoni* concerned in Rocky Mountain spotted fever, tularemia, tick paralysis and Colorado tick fever. In Australia the cause seems to be the common scrub tick, *Ixodes holocyclus*.

Attempts to reproduce the disease in animals by the *D. andersoni* have been unsuccessful, even when the same tick from an actual patient has been applied. It must be noted, however, that the engorged female usually refuses to feed. Though the dog tick, *Rhipicephalus sanguineus* has never been reported as causing the disease in nature experimentally the eggs have been found capable of doing so.

In nature, man is an accidental host, the tick being primarily a parasite of small rodents. The adult female lays about 300 eggs daily and a total of about 6 000. The evidence so far available points to the eggs or the egg-laying as responsible for the symptoms. For infection of emulsion of eggs in saline subcutaneously or intraperitoneally into dogs sets up the train of symptoms. There was no effect when they were administered per os.

Details are given of the case of a girl, 6 years of age, who complained of itching and burning pain in fingers and toes, soon followed by ataxia, increasing muscular weakness, loss of deep reflexes—in fact symptoms typical of lower motor neuron lesion not of the peripheral nerves, but of the anterior cornual cells—a mild irritative lesion of the posterior sensory roots and a severe irritative lesion of the anterior horn cells of the cord. There was no involvement of the cranial nerves in this case. Examination revealed an engorged tick on the scalp. Recovery was complete in 48 hours after its removal, though it is probable that had it not been found, death would have resulted from respiratory paralysis. The suggestion is made that the tick produces excessive egg venom early in the egg formation stage and excretes it by the enlarged over-active salivary glands. (An instructive article which should be read in the original. Knowledge of the condition should be disseminated in areas where it is liable to occur for many physicians may not be aware of it. Recovery soon follows removal of the tick but death may result from failure to recognize the train of symptoms.)

H. H. S.

GIBBS (J. Heyward). Tick Paralysis in South Carolina.—*Jl Amer Med Assoc* 1938. Sept. 10. Vol 111. No 11. pp 1008-1009. With 3 figs.

Tick paralysis, an ascending paralysis of the Landry type, has been recognized in some mid-western States for a number of years. The case now reported from South Carolina is the first to be recognized in the eastern States. The patient was admitted to hospital with weakness and incoordination of the legs, absent knee jerks but normal sensation responses. The weakness and ataxia spread rapidly to the arms, and speech became thick but there was no difficulty in swallowing. At this point, while the condition was becoming worse a distended

wood tick was found attached to the right occiput. It was removed and the patient rapidly and completely recovered. The patient was afebrile except for a temperature of 100°F on the evening of the first day in hospital.

It is supposed that this condition is due to a toxin from the salivary glands of the tick. *D. andersoni* was responsible for a similar case in the State of Washington. As Rocky Mountain spotted fever has been reported from South Carolina it is possible that this case of tick paralysis (a totally different condition but caused by the same tick) may be a precursor of other cases which can be handled effectively only if promptly recognized. It is thought that ticks of the genus *Ixodes* may also cause the condition. C IV

MAIL (G. Allen) Tick Paralysis in British Columbia.—*Bull. Brit. Columbia Board of Health* 1938 Oct Vol 8 No 15 pp 185-197

A fatal case of tick paralysis in a girl aged 3 is recorded. Two ticks, one a large fully engorged female, were found over the occipital protuberance and removed, but as the respiratory muscles were affected when this was done the child died within a few hours. More than 150 cases of this disease, many of which were fatal, are recorded in the files of the Division of Entomology at Kamloops and every year sheep, cattle and, more rarely, horses succumb to it. It is therefore important that it should be recognized.

Symptoms are detailed and it is pointed out that the ticks may be attached to any part of the body. From the first appearance of symptoms to complete paralysis and death may be as short a period as 2 days, but is more usually 3 to 5. Complete and early removal of the ticks and mouth parts by excision if necessary is essential.

The tick chiefly incriminated is the common wood tick, *Dermacentor andersoni* Stiles. *Ixodes ricinus* Linn., the coast tick, though not known to produce paralysis, may give rise to troublesome ulcers.

C IV

ROBINOW (Meinhard) & CARROLL (T. B.) Tick Paralysis due to the Bite of the American Dog Tick. Report of a Case observed in Georgia.—*Jl Amer Med Assoc* 1938 Sept 17 Vol 111 No 12 pp 1093-1094 With 1 map

The onset of tick paralysis is sudden and its progress rapid. Flaccid paralysis begins in the legs and spreads to the arms and neck. Speech and deglutition become difficult, the pupils dilate and death may supervene from respiratory paralysis. Early removal of the tick is followed by rapid recovery, but delay may be dangerous. Paralysis seems to occur only after the impregnated female tick has fed for several days on a patient and is probably not due to a living virus but to a venom elaborated in the developing ova. *Dermacentor andersoni*, which is also a vector of Rocky Mountain spotted fever, tularemia, relapsing fever and probably Colorado tick fever, has been responsible for all human cases so far reported in the United States and Canada.

The case here reported is the first from Georgia and the tick was unlike the others, *Dermacentor variabilis*. The patient was a girl of 9 years who was acutely ill, and showed a temperature of 100.6°F on admission to hospital. There was flaccid paralysis of the legs

Incoordination of the arms thickness of speech and nystagmus with normally reacting pupils. Examinations of the cerebrospinal fluid, blood urine and faeces were negative. Two ticks were first found one engorged female and one male, attached to the scalp. Recovery promptly followed the removal of these. Later a second female showing no signs of engorgement was found and removed.

C W

WEBER (Neal A) The Sting of an Ant.—*Amer J Trop Med* 1937 Sept Vol 17 No 5 pp 765-768 With 1 fig.

The Ponerae subfamily of ants possess a well-developed sting and a virulent poison. In Central and South America a widespread species is *Paraponera clavata* Fabr. about an inch in length, blackish-brown in colour with large mandibles. It is known in Venezuela as the Cumanagato and as the viento cuatro horniga or "24-hour ant" because it is believed to kill a man in 24 hours, in British Guiana as the Mumun, and in Brazil as the Tucandera. If a nest is disturbed they emerge in large numbers and attack and may climb trees and drop on the intruder. If stung by many a man might die in 24 hours, for the author's account of being bitten by a single specimen shows that the sting is severe. He was stung through heavy khaki on the knee and in eight minutes there was a "white welt" with inflamed periphery and a burning sensation. The site was bathed with ammonia, on the idea that the poison was formic acid, and a wet ammonia pack applied. For the next two hours the burning sensation was intense and the limb seemed paralysed. These sensations then gradually



Blister caused by sting of *Paraponera clavata* Fabr.
(Reproduced from the *American Journal of Tropical Medicine*)

disappeared but $4\frac{1}{2}$ hours after the stinging there was a blister 53 mm long 20-29 wide and 7 mm. in height with a reddened base with vesicles. The knee felt stiff and 24 hours later there was an inflamed area 60×70 mm and the blister which had been opened had re-formed and the rest was covered with small vesicles. Four days after the injury the area was still red and the large blister discharged pus the redness remained for another week and the wound did not heal completely till 19 days after its being inflicted. [Since some of the poison was probably absorbed by the clothing and the patient did not therefore receive the full dose it is obvious that multiple stings might be very serious. The nature of the venom should be investigated.]

H H S

MALARIA

PRECIS OF ABSTRACTS IN THIS SECTION

TCHITCHIRABINE and HOFFMANN (p 580) use a test in which HIO_4 is the reagent for detecting plasmoquine in urine. One tenth mgm per litre can be identified.

In the paper by FARINAUD (p 581) is given an account of the prophylactic measures necessary during military operations in Indo-China. SHUPIZINA (p 581) shows that mixtures of larvicides with large volumes of talc such as 1 in 50 or 1 in 100 are inefficient and costly. The resistance of larvae to the action of arsenical poisons increases with age. DAVEY and GORDON (p 582) recommend that the maximum size of aperture for screening against mosquitoes in West Africa must not exceed 0.047 inch. This is provided in a screen of 16 meshes to the linear inch composed of wire of 28 S W G.

MILAM and COGGESHALL (p 583) infected 30 white and 12 negro patients with *P. knowlesi* by inoculation. The negroes were less susceptible than the whites and reinoculations were failures. SINTOV *et al* (p 583) failed in an attempt to infect two patients with *P. cynomolgi*.

DAS GUPTA and CHOPRA (p 583) consider that in monkey malaria prontosil soluble is less satisfactory than atebuin.

The paper by MANWELL (p 584) is concerned with the identification of those species of bird malarial parasites which are well established.

HEGNER and WOLFSON (p 584) found exo-erythrocytic schizonts (which they call *Toxoplasma*-like parasites) in association with *P. calhemerium*, *P. relictum* and *P. nucleophilum*. Attempts to separate *P. calhemerium* from the schizonts failed but the authors still hold that it is not proved that the schizonts belong to the plasmodium. WENYON disagrees with this and contends that toxoplasmas reproduce by binary fission and cannot be likened to the schizonts in question.

HEWITT (p 585) discovered that in *P. calhemerium* infections the ring forms prefer young red cells. Multiple infections occur early in the cycle but diminish later owing to destruction of the multiple-infected cells. The proportion of multiple infections varies inversely as the proportion of young red cells.

HEGNER and ESKRIDGE (p. 535) found that the serum of birds in the acute phase of infection with *P. calhamerium* is able to ward off the ill effects of this infection if injected into others, but cannot suppress the infection since the parasites are as numerous in them as in controls.

BLOOM and TALLAFERRO (p. 588) describe the common infarcts in the spleens of canaries infected with *P. calhamerium* which result from thrombosis of the splenic veins. These regenerate completely the process being initiated by macrophages followed by infiltration of lymphocytes. DECOURT and SCHREIDER (p. 586) found evidence to suggest that malarial parasites in fowls infected with *P. gallinaceum* are stored in masses of lymphoid tissue when they cannot be found in the spleen. No recognizable parasites can be seen but they may exist as certain granules found within lymphoid cells.

BISHOP *et al.* (p. 587) show that *P. relictum* infection may persist in canaries for more than 8 years. BASU (p. 587) describes a parasite of herons in India for which he proposes the name *P. heroni*. Development was observed up to the oocyst stage in *Culex fatigans*. MAXWELL and HARTIG (p. 588) show that *P. rugosus* and others of the *P. rouxi* type in birds are highly susceptible to both atabrin and plasmoquine.

C IV

TCHITCHIBABINE (A) & HOFFMANN (Ch) Méthode d'identification des gamétocoides synthétiques dans l'urine par une réaction colorée. (Method of Identification of Synthetic Gametocoides in the Urine by a Colour Reaction.—*Bull Soc Path Exot* 1938, Oct. 12, Vol 31 No 8 pp 740-742)

The authors report that iodic acid HIO_3 is a much more sensitive reagent for the detection of plasmoquine in the urine than is chloranil (tetrachloroquinone) which was recommended by SCHULMANN, WEINBOEFER & WILGIER. The test is carried out as follows —

200 cc. of urine are made alkaline by the addition of 50 cc. of a 30 per cent solution of caustic soda. This is then extracted thrice in a separating funnel with ether 25 cc. each time. The ethereal solution, 75 cc., is shaken with a few grammes of anhydrous potassium carbonate and then filtered into a 250 cc separating funnel. Five cc. of 10 per cent sulphuric acid are added after shaking, the lower layer is decanted into an ordinary test tube. The contents of the tube are gently boiled for 30 seconds to drive off the ether. After complete cooling under running water 2 cc. of a 10 per cent watery solution of iodic acid are added the tube is then shaken and left to settle.

If plasmoquine is present in the urine a violet colour develops in 2 or 3 minutes this darkens somewhat and lasts for nearly half an hour. By this method it is possible to identify plasmoquine in quantity as small as a tenth of a milligramme per litre of urine. Rhodoquine and plasmocid also give colour reactions with this test. With plasmocid the colour only appears after a delay of 15 to 20 minutes, as compared with 2 or 3 minutes with plasmoquine. If appreciable quantities are present plasmoquine gives a violet blue colour plasmocid violet red. With plasmoquine the colour persists for about half an hour with plasmocid it begins to fade after a quarter of an hour.

Norman White

FARINAUD (M. E.) La prophylaxie du paludisme dans les troupes en campagne. [Malaria Prophylaxis among Troops on Service].—*Ann de Méd et de Pharm Colon* 1938 July-Aug-Sept. Vol. 36 No 3 pp 583-608 With 4 charts.

Three examples are given from the military history of French Indo-China of the havoc caused by malaria during military operations in the hilly interior of that country. There follows an excellent account of the prophylactic measures that could and should be taken to prevent or mitigate such catastrophes. The recommendations contain nothing new or original. Examples are given of the results obtained by drug prophylaxis in malarious posts. The paper is designed primarily for the benefit of the military medical officer. V 14

SHIPIZINA (N. K.) A propos de l'action des poudres insecticides sur la larve d'anopheles en relation avec le degré de dispersion des toxiques et de la concentration des substances ajoutées. [Action of Insecticide Powders on Anopheline Larvae in Relation to the Degree of Dispersion of Toxic Substance and the Concentration of Added Substances].—*Méd Parasit & Parasitic Dis* Moscow 1938. Vol. 7 No 3 [In Russian pp 346-370 With 13 figs [18 refs.] French summary pp 371-372.]

Increase in the concentration of substances such as talc added to toxic powder larvicides prolongs the death time of larvae. Thus mixtures of 1 in 50 or 1 in 100 are much slower in action than a mixture of 1 in 10 and the percentage of larvae destroyed is less. The presence of detritus in suspension protozoa etc. in natural breeding places explains why the action of larvicides is sometimes slower there than in the laboratory other conditions being equal. The solid pellicule formed by diluents in excess results in a slowing down of the filtration in the larva. This is most marked in young larvae whose filtering apparatus overcomes with difficulty the force of adhesion of the particles of talc. Another result is that the concentration of the toxic substance in the intestine of the larva is considerably diminished. Experiments have shown that the mixture of the larvicide with a large volume of talc such as 1 in 50 1 in 100 is irrational from the point of view of the alimentary physiology of larvae and is unnecessarily costly.

The resistance of larvae to the action of arsenical poisons increases with age. For young larvae arsenic is more toxic than Paris green. It is a finer powder with a higher degree of dispersion. Its arsenic content is not sufficiently high for fourth stage larvae. Relative to the size of their bodies young larvae have a stronger capacity of filtration than fourth stage larvae. In natural conditions the food of a larva takes from 30 to 60 minutes to pass from the anterior end of the oesophagus to the anterior end of the posterior intestine at a temperature of 25°. When poison is taken the intensity of filtration, and consequently the rate at which food passes through the alimentary canal, depends on the dose. If more than a lethal dose is taken filtration and the passage of food stops in from 10 to 20 minutes. In such cases the poison does not pass beyond the anterior end of the stomach. With lesser doses this action is delayed but there is no possibility of the expulsion of the poison before the commencement of such action.

DAVEY (T. H.) & GORDON (R. M.) The Size of Aperture Necessary in Screencloth Intended for the Protection of Dwellings in West Africa. — *Ann Trop Med & Parasit* 1938, Dec. 21 Vol. 32, No. 4 pp. 413-424 With 3 figs. [10 refs.]

In July 1937 it was reported from the Gambia (and confirmed by the authors) that mosquitoes were getting through the screens at the Government Hospital. These screens were composed of wire of No. 30 Standard Gauge with 14 meshes to the linear inch giving apertures of 0.059 of an inch. Consequently BLACKLOCK [this *Bulletin* 1939 Vol. 35 p. 259] stated that screencloth of this type was clearly unsafe for West African conditions. The authors then commenced experiments in order to select a screencloth which, while admitting the maximum amount of air and light, would be capable of excluding mosquitoes from dwellings.

Screencloths chosen for the experiment were —

(a)	14 mesh	30 S W G	aperture 0.059 inch (1.5 mm.)
(b)	16 "	30 "	0.050 " (1.3 mm.)
(c)	16 "	28 "	0.047 " (1.2 mm.)
(d)	18 "	30 "	0.043 " (1.1 mm.)

16 000 mosquitoes were used, chiefly "wild" *Anopheles gambiae* and *A. funestus*; other species included *Aedes tritaenatus* and *A. simpsoni*. Specially designed cages were employed but as mosquitoes which passed through the screens were not actually seen doing so a separate cell was constructed of glass in which the movements of the insects could be observed under a magnifying glass. The apparatus and the attitudes of mosquitoes passing through the mesh are illustrated in text figures.

The experiments showed that *Anopheles gambiae* and *A. funestus* were able to pass through the apertures of 0.059 of an inch in screen (a). *A. funestus* could pass through the apertures of 0.050 of an inch in screen (b) and that neither species passed through apertures of 0.047 and 0.043 of an inch in screens (c) and (d) respectively. The two species of *A. tr.* were able to pass through the apertures in screen (a) but were not tested with the other screens.

The authors recommend that the maximum size of aperture for screencloth against mosquitoes in West Africa must not exceed 0.047 of an inch (1.2 mm.) this aperture is provided in a screen having 16 meshes to the linear inch composed of wire of 28 Standard Wire Gauge.

The requisite aperture could be obtained by using the thinner stronger and more durable stainless steel. The greater number of meshes to the linear inch would admit more air and light while affording the same protection. Objections that the steel is not always stainless and that the initial cost is high have been made but as the production of really stainless steel becomes perfected and the demand increases it should soon be possible to supply a screencloth of great durability at a reasonable price.

There is some confusion in the literature about the formula for designating different types of screencloth. The important point, however, is the size of the aperture so the formulae of previous investigators are converted into sizes of apertures in inches and the results of their experiments tabulated. From this table it is seen that there are no published records of mosquitoes passing through apertures

less than 0.048 of an inch (1.2 mm.) and that very little work has been done on *Culicines*.

Observations made on the movements of mosquitoes while penetrating the screens show that the thorax enters the aperture diagonally. The legs of a mosquito do not prohibit its passage inability to pass depends upon the dorso-ventral diameter of its thorax. [There will be many to whom this work is of considerable practical interest though some readers may not understand that the two names *A. gambiae* and *A. costalis* refer to the same mosquito] H S Leeson

MILAN (D. F.) & COGGESHALL (L. T.) Duration of *Plasmodium knowlesi* Infections in Man.—*Amer J Trop Med* 1938 July Vol. 18 No 4 pp 331-338

The paper reports that 30 white and 12 negro patients with general paresis were infected by inoculation with *Plasmodium knowlesi* as a therapeutic measure. In the white patients the parasites first appeared in the blood as early as the third day and as late as the eighteenth day and they persisted for three to fourteen days. As tested by injection into susceptible monkeys the blood was negative on the 18th to 131st day after the original inoculation. Of the patients found negative by monkey inoculations 18 were re-inoculated with intervals of 30 to 491 days and all proved refractory. The negro patients were less susceptible than the white and the duration of visible infections varied from 2 to 11 days. The blood was infectious to monkeys as late as the 36th day and non-infectious as early as the 28th day. Re-inoculations proved unsuccessful. It is noted that in the case of one negro the blood was infective to monkeys from the 2nd to 18th day though parasites were never detected in the blood smears. It seems that similar invisible infections may occur with human malaria and the failure to recognize them is due to the want of a sufficiently sensitive host. C M Weyson

SINTOV (J. A.) HUTTON (E. L.) & SHUTE (P. G.) Failure to transmit an Infection of *Plasmodium cynomolgi* to Man by Blood Inoculation and by Mosquito Bites.—*J Trop Med & Hyg* 1938 Aug 1 Vol 41 No 15 pp 245-246 [16 refs.]

The paper describes unsuccessful attempts to infect two human beings with *Plasmodium cynomolgi*. In one case the patient received infected monkey blood intramuscularly and sporozoites intravenously while in the second case infected mosquitoes were allowed to bite the patient who also received an intravenous injection of sporozoites. It is of interest to note that the strain of parasite had been sent by air mail from India in defibrinated monkey blood to which 0.2 cc. of 50 per cent. dextrose solution was added per 10 cc. of blood. Though the blood had been exposed to the ordinary climatic conditions on the journey of seven days a monkey was successfully infected in London. Of a number of *Anopheles maculipennis* var. *atroparvus* fed on an infected monkey 36 per cent. became infected. C M W

DAS GUPTA (B. M.) & CHOPRA (R. N.) Studies on the Action of Synthetic Drugs on Simian Malaria. Sulphonamide Derivatives.—*Indian Med Gaz* 1938 Nov Vol. 73 No 11 pp 665-667

The authors have treated monkeys inoculated with *P. knowlesi* with prontosil soluble administered intravenously. They have found

that daily doses of 0.5 and 1 cc. are insufficient to check the infection. Larger doses (3 cc. daily for three days) are sufficient to bring about a cure but these are quite out of proportion to the human doses. In its action the drug resembles quinine but for the cure of an infection it is less satisfactory than atabrin. C M H

MANWELL (Reginald D.) The Identification of the Avian Malariae.—*Amer J Trop Med* 1938, Sept. Vol. 18, No. 5, pp 545-575 [28 refs.]

The increased interest which has been taken in bird malaria during recent years has resulted in the establishment of a number of new species of bird malarial parasite. Some of these are undoubtedly good species while others are doubtful. In this paper the author discusses the differentiation of about a dozen species which appear to him to be well established. He gives a useful key which will enable observers to separate the species on morphological grounds, while in a table is set forth a comparison of the infections which are produced in canaries by a number of species inoculable to these birds.

The paper is one which must be consulted by those engaged in the identification of bird malarial parasites. C M H

HEGNER (Robert) & WOLFE (Fruma) Association of *Plasmodium* and *Toxoplasma*-like Parasites in Birds.—*Amer J Hyg* 1938, Nov Vol. 28, No. 3 pp. 437-454. With 11 figs. [20 refs.]

The authors revert [this *Bulletin* 1938, Vol. 35 p. 730] to the subject of the exo-erythrocytic schizonts which have been assumed to be stages of development of certain bird malarial parasites and the possible relationship of these to the common toxoplasms of birds. Twelve strains of bird malarial parasites belonging to eight species have been examined in various birds chiefly canaries and the schizonts in question have been found in association with *P. cathemerium*, *P. redicium* and *P. multophilum*. The general account is somewhat obscured by the use of the expression *Toxoplasma*-like parasite for the exo-erythrocytic or endothelial schizonts which most observers have assumed to be stages of development of the malarial parasites with which they appear to be always associated.

The histories of a number of transmissions of strains are given and the presence or absence of the schizonts is discussed. Attempts to separate *Plasmodium cathemerium* from the exo-erythrocytic schizonts (*Toxoplasma*-like parasites) failed, though the experiments involved sub-inoculations, passage through mosquitoes, treatment with quinine, differential viability, inoculation into chicks and centrifugation. In spite of this it is still held that it has not yet been proved that the schizonts belong to the plasmodium.

[To the reviewer it seems that such a discussion is hardly likely to solve the problem, if indeed there is a problem, for no observer has yet shown that a bird toxoplasma, which is only known as the small rounded parasite in the nuclear notch of a blood leucocyte ever reproduces by schizogony in endothelial or other cells or gives rise to schizonts of the type under discussion. The expression *Toxoplasma* like would bring to mind the fairly characteristic intra-leucocytic forms just referred to and would not suggest large multinucleate schizonts, which are not known as stages of development of toxoplasma. In all recent work that has been carried out there has been a complete

failure to demonstrate for the toxoplasms any other type of reproduction than binary fission. Recent observations by the reviewer of a strain which was inoculable to both birds and mammals are in support of this while he is of the opinion that the toxoplasms are not protozoa at all but that they are vegetable organisms related to *Histoplasma capsulatum* or similar yeast like parasites.] C M W

HEWITT (Redginal) Multiple-Infected Red Cells in Avian Malaria.—*Amer J Hyg* 1938 Nov Vol 28. No 3 pp 321-344 With 3 figs. & 1 plate [20 refs.]

A study of *Plasmodium cathemerium* infections in canaries has shown that at the beginning of the 24-hour cycle of the parasite as many as 100 per cent of the ring forms of the parasite are in young red cells. Of these infected cells 66 per cent contained a single parasite the rest harbouring two three four or five. As the cycle progressed the percentage of multiple infections diminished till finally no cells with more than two parasites could be found. It was evident that with the growth of the parasite the cells were unable to withstand more than two parasites and those with three or more had been destroyed.

Generally speaking the number of multiple infections bore a relationship to the percentage of young red cells present at the time of sporulation. Where 100 per cent of the red cells were young no multiple infections occurred. With reduction in the percentage of young red cells in the blood there was an increasing number of multiple infections a state of affairs which seems to indicate a preference on the part of the merozoites for young cells even when this entails producing multiple infections. When all the red cells are young the merozoites have little difficulty in finding suitable cells. Similarly by increasing the percentage of young red cells in the blood by treating the birds with phenylhydrazine the number of multiple infections became reduced. Generally the distribution of the parasites in the young red cells was found to be such as would have occurred if no mature cells had been present. C M W

HEGNER (Robert) & ESKRIDGE (Lydia) Passive Immunity in Avian Malaria.—*Amer J Hyg* 1938 Nov Vol. 28. No 3 pp 367-376 With 2 figs.

In an experiment to discover if the blood of birds infected with *Plasmodium cathemerium* contains substances capable of protecting against infections in other birds, the following experiments were carried out. Serum from healthy birds from birds which had passed the acute phase of an infection and from birds in the acute phase was prepared and dried. Birds injected with the healthy serum were found to be more susceptible to infection than normal birds. The same was true of birds injected with the second type of serum, but birds injected with the acute serum did not appear to suffer from the infection which followed inoculation though as regards numbers of parasites the infections were as intense as in the other treated birds. It would appear that the serum of birds in the acute phase of infections contains some substance which is unable to suppress the infection in fresh birds though it is capable of warding off the ill effects of this infection. Before pronouncing finally on the question the authors propose carrying out further experiments to test this view more fully. C M W

BLOOM (William) & TALLAFERRO (William H.) Regeneration of the Malarial Spleen in the Canary after Infarction and after Burning.—*Jl Infect Dis* 1938, July-Aug Vol. 63. No. 1 pp 54-69 With 5 plates. [21 refs.]

It is a common occurrence for infarcts to form in the spleens of canaries infected with *Plasmodium cathemerium*. They are haemorrhagic in character and result from thrombosis of the splenic veins. They extend from the hilum to the capsule which does not become involved in the primary necrotic process. Such infarcts, even when large and involving the entire spleen, become completely regenerated. The first step in repair is the appearance of macrophages between the healthy spleen and capsule tissue and the necrosed area. These macrophages arise from the reticular cells, macrophages and lymphocytes of the adjacent healthy tissues and from haematogenous agranulocytes (lymphocytes and monocytes). A young scar is formed containing many fibroblasts and macrophages. The scar is then infiltrated with lymphocytes which migrate from the healthy tissue and blood vessels or arise *in situ* by the transformation of fibroblasts into large lymphocytes and the proliferation of medium and large lymphocytes. Nests of proliferating lymphocytes associated with the smaller arteries give rise to new nodules, while the fibroblasts become the reticular cells of both the red and white pulp. The venous sinuses arise from the scar capillaries.

The same type of regeneration follows experimental burning of the tip of the spleen but it is slower owing probably to the absence of the capsule which the operation of burning has destroyed. C M W

L. DECOURT (Ph) & SCHNEIDER (J) Les lacunes de nos connaissances sur le cycle plasmodial chez l'hôte vertébré [Gaps in our Knowledge of the Plasmodial Cycle in the Vertebrate Host].—*Bull Soc Path Exot* 1938, Juin 6 Vol 31 No 7 pp 603-609 22 refs

ii — & — Note préliminaire sur la recherche de la localisation et de la morphologie des plasmodes pendant les périodes d'infestation latente [Localization and Morphology of Plasmodia during Latent Infestation].—*Ibid* pp 609-614

i. In the first of these papers the authors review the observations which have been made to discover the fate of malarial sporozoites which have been injected by mosquitoes. The question as to what happens to them between their injection and the appearance of malarial parasites in the blood still remains unanswered. The view held by some that the recently discovered endothelial schizonts are developed only from sporozoites the authors regard as untenable. They believe that these schizonts are not essential stages in the development of malarial parasites but are rather accidental by-products of the normal cycle. They are of irregular occurrence and are found in very varying numbers in infections following direct blood inoculations as well as sporozoite infections.

ii. In the second paper are recorded experiments which were suggested by observations which had been made on the property of mesenteric lymphatic glands to store up bacilli such as those of typhoid fever and to discharge them with pathogenic effects when certain stimuli were applied to the splanchnic nerve. It seemed possible that

malarial parasites might similarly be stored in the lymphatic glands particularly as prolonged search for parasites had been carried out without result in practically all other organs and tissues of the body during the latent phases of infection.

The experiments were carried out with *Plasmodium gallinaceum* of fowls. In the place of actual glands the fowl possesses masses of lymphoid tissue. An emulsion of such tissue from a fowl which had apparently recovered from its infection injected in very small dose (0.002 cc) into a clean fowl produced an intense infection, whereas the injection of large quantities of spleen emulsion failed to infect. A similar result was obtained by injection of a small dose of thymus emulsion. A microscopic examination of the infecting material did not reveal any recognizable malarial parasites. On the other hand in the cytoplasm of the lymphoid cells were found red to purple staining granules 1 to 1.5 μ in diameter. Similar granules have also been seen in the large lymphocytes of the blood but only just before the appearance of malarial parasites in the red blood corpuscles. The granules have never been found in healthy birds. A possible light was thrown on the nature of these granules by observations made on the behaviour of malarial parasites kept in sodium citrate solution at 28°C. The parasites within the red cells were seen to break up into daughter cells and these without leaving the cell became transformed into chromatin-like granules resembling those mentioned above.

It is evident that further study is required before a final opinion can be given on the part played if any by these granules in the development of malarial parasites but the result of this is promised soon.

C M W

BISHOP (Ann) TATE (P) & THORPE (Mary Vincent) The Duration of *Plasmodium relictum* Infection in Canaries.—*Parasitology* 1938 Sept Vol 30 No 3 pp 388-391

It has been shown that infections of *Plasmodium relictum* may persist in the peripheral blood of canaries as ordinary schizogonic stages for as long as 8 years and 3 months and that during this period the blood is infective to clean birds.

C M W

BASU (B C) Studies on a Malarial Infection in a Paddy Bird.—*Jl Malaria Inst of India* 1938, Sept Vol 1 No 3 pp 273-284 With 1 text fig & 14 figs. on 1 plate. [64 refs.]

The parasite described from India appears to be a new species for which the name *Plasmodium heroni* is proposed. It occurs in the pond heron *Ardeola grayi* Sykes in which it produces frequently a heavy and fatal infection. The schizonts give rise to 6 to 26 merozoites the larger schizonts often occupying the side of the red cell and encircling the nucleus. The gametocytes are elongate while the pigment is brownish black in colour. The infection was readily inoculable from heron to heron but not to sparrows, crows domestic fowls or canaries. Development in *Culex fatigans* up to the oocyst stage was observed. A search of the internal organs of infected birds failed to reveal any endothelial schizonts such as have been described for *P. gallinaceum*.

C M W

MANWELL (Reginald D.) & HARING (Ann T.) *Plasmochin and Atabrin Therapy in Plasmodium vaughani Infections.*—*Rev. di Parasit.* Rome. 1938. Sept. Vol. 2. No. 3. pp. 207-218. With 24 figs. on 1 plate [17 refs.]

Infections in canaries of *Plasmodium vaughani* a bird malarial parasite belonging to the group of small organisms of which *P. rossi* is the type and *P. hexamerum* and *P. nucleophilum* other members, have been shown in the experiments recorded in this paper to be highly susceptible to both atabrin and plasmoquine. Complete sterilization of the birds was obtained with both drugs after about a week's treatment. The other organisms are also susceptible to the drugs a fact which shows their close relationship to one another. All these parasites resemble one another in that they multiply slowly while relatively large numbers of organisms are present in the blood of infected birds during the chronic phases of infection. C M IV

HELMINTHIASIS.

PARALS OF ABSTRACTS IN THIS SECTION

MENDHEIM (p. 588) mentions LOOSS a method of collecting helminths for examination.

Helminth eggs were found on the legs of flies by POKROVSKY and ZIMA (p. 589).

AFRICA and DE LEON (p. 589) studied the phagocytic action of giant cells after the eggs of various helminths had been injected into the peritoneum of monkeys. *Ascaris* eggs are surrounded by the giant cells the eggs of *Fasciola* and *Schistosoma* are crushed or penetrated or pulled asunder by the cells and heterophyid eggs are surrounded only by histiocytes and endotheliocytes, without giant cells. COLBERTSON (p. 590) states that the immunity developed against helminths is similar to that against other infectious agents both as regards the host and the parasites.

NICHOLS and GUKAWARDANA (p. 590) describe a method of composting town refuse and night soil which causes the destruction of all *Necator* material and *Ascaris* eggs.

The remainder of the abstracts in this section deal with the proportion of the various helminths found in the examination of communities in Africa, America and China. The majority are records of examinations of faeces by different methods but FISK (p. 591) gives the results of careful examination of the whole of the alimentary tract in 120 consecutive autopsies. C IV

MENDHEIM (H.) Ueber eine Zweckmässige abänderung der Looss'schen Schüttelmethode nebst Bemerkungen zur helminthologischen Technik. [A Useful Alteration of Looss's Shaking Method and Remarks on Helminthological Technique.]—*Ztschr. f. Parasitenk.* 1938. Aug. 19. Vol. 10. No. 3. p. 438.

Looss it is said, advised for the collection of helminths in a state satisfactory for examination that they should be made to extend themselves by shaking the intestinal contents with saturated sublimate

solution allowing to settle and adding half saturated sublimation solution Mendheim advises apparently as something new and as improvement that the worms themselves should be picked out and first washed in water or normal saline As a stain para-carmin is advised and for subsequent bleaching some days in undiluted Lugol solution.

Clayton Lane

POKROVSKY (S N) & ZIMA (G G) Mouches comme transporteurs des oeufs des helminthes dans les conditions naturelles [Flies as Carriers of Helminth Eggs in Nature]—*Med Parasit & Parasitic Dis* Moscow 1938 Vol 7 No 2 In Russian pp 262-263 French summary p 264]

Of 1,911 flies examined 0.47 per cent carried worm eggs namely *Diphyllobothrium* and *Hymenolepis* each by 3 flies *Ascaris* by 1 and *Enterobius* by 2 and they did so mostly on their legs The need for exclusion of flies from shops is stressed.

C L.

AFRICA (Candido M) & DE LEO (Walfredo) Observations on the Mechanism of Phagocytosis of Various Helminth Ova.—*Livro Jubilar do Prof L. Travassos* Rio de Janeiro 1938 pp 1-10 With 5 plates. [10 refs.]

The eggs concerned were those of *Ascaris lumbricoides*, *Fasciola gigantica* the heterophyid *Monorchotrema lishokui* and *Schistosoma japonicum*. The method was by serial sections stained with haematoxylin and eosin—in the case of the first three worms of nodules formed in the mesentery and omentum after intraperitoneal injection of the eggs into *Afarcus cynomolgus* in the fourth worm, of natural material from man. The observations were confined as much as possible to the mechanism of the phagocytic action of giant cells and these are in fact largely pictured as machines.

In the case of *Ascaris* eggs a wrapping of giant cells is formed round them but there seems no attempt on the part of the phagocytes to make an opening on or break the eggshells forcibly. This engulfment is commoner with eggs that have become embryonated, while these cells have appeared as early as 4 and have persisted in a well nourished state till as late as 74 days after inoculation while in a monkey that died six months after this only a few giant cells loitering lazily are left around the place where eggs were presumably located before. Fibrosis advances from the periphery of the pseudotubercles formed round egg clusters.

In eggs of *Fasciola* there is no larval development but the action of the giant cell is described as hugging and crumpling the egg by means of its powerful arms battering the shell, getting inside it expanding and cracking it into fragments or acting like a steam roller upon an empty egg. As to schistosome eggs three mechanical mental pictures are drawn of the giant cell—A fracture of the shell by the action of the nuclei into a wedge and forcing this into the shell by the action of the attacking cell's cytoplasm an encirclement without a nuclear wedge so that centripetal pressure breaks the shell at its weakest point and an anchoring of cytoplasmic processes at convenient points in the surrounding fibrous tissue a simultaneous pull from all directions and the tearing asunder of the whole shell. Heterophyid eggs do not evoke giant cells only sheets of pure histiocytes and

endotheliocytes in fibrous tissue stroma. This very noticeable indifference of the giant-cells towards heterophyid eggs, we will interpret as an example of negative chemotaxis." C. L.

CULBERTSON (James T.) Recent Contributions to the Immunology of Helminthic Infections.—*Arch. Pathology*, 1938. Jan. & Feb. Vol. 25 Nos 1 & 2. pp 85-117 256-280 [5 pages of refs.]

A summary of the literature on immunity to helminths (which has at least in the main, been abstracted in this *Bulletin*) is summed up thus —

It is apparent from what has been given here that the subject of immunity against helminths has been attacked by a large number of workers and that their contributions have covered many aspects of the whole field. Although there are still some who hesitate to agree that immunity to any helminth has been experimentally established (Schmid) the great majority of workers are more favourably inclined and tend to assume the point of view that the mechanism of immunity against helminths is similar to that against other infectious agents. The manner in which the state of immunity against helminths is attained, the humoral and cellular responses of the immune host against these parasites, and the effects of the defense agencies of the host on the parasites are so nearly identical with the immune phenomena associated with other types of infectious agents that one must either accept the fact that immunity is developed against the helminths or believe that no immunity is manifested against any agent of disease.

NICHOLLS (Lucius) & GUKAWARDANA (Samson A.) The Destruction of Helminth Ova in Flight Soil by Composting.—Reprinted from *Ceylon J. Sci.* (Sect. D. Med. Sci.) 1939 Feb. 11 Vol. 5. Pt. 1. 8 pp. With 5 figs. on 1 plate.

In Ceylon, night soil is in places disposed of by composting which produces fine odourless mould valuable as a manure. This investigation was undertaken to determine whether the rise in temperature which occurs in the process sufficed to destroy the free living ankylostome and *Ascaris* stages.

The town refuse, freed from pots, pans, coconut husks and suchlike is stacked in rectangles of 6 by 4 feet and 4 feet high. In each rectangle is dug a trench 4 by 2 feet and 2 feet deep which is filled with night soil and covered with the refuse which had been dug out. The whole is then sprinkled with water daily for a week. The rectangle is then so mixed that the edges become the middle. In the middle is then dug a trench corresponding to 7 per cent. of the volume of the rectangle and this is filled with night soil covered and watered as before for another week. At the end of 2, 3 and 4 weeks this mixing, trenching, covering and watering are repeated but the amounts of faeces added are respectively 5, 3 and 3 per cent. of the volume of the heap. No further addition of faeces is made but the daily moistening and weekly turning over are continued for 3 months by which time the material has become a fine mould. The fermentation which has been going on has raised the temperature this rise is greatest at the junction of faeces and refuse and in all but one of the heaps tested it reached 60°C. In the exception 57°C. Controls showed that a temperature of 45°C. killed all *Necator* material within 2 hours, and one of 42°C. within 12 hours. In the final compost all *Ascaris* eggs were dead and any

larvae present were those of free-living nematodes. The turning over of the rectangular heaps in the manner described is a completely essential part of the procedure which was as effective in the rains as in the drier seasons. C L

FISK (Guy H.) Helminthiasis in Lagos, Nigeria.—*Trans Roy Soc Trop Med & Hyg* 1939 Feb 28 Vol 32. No 5 pp 645-652.

The results of a count of gastro-intestinal worms obtained at 120 consecutive routine autopsies.

The whole gastro-intestinal tract was opened and its mucosa scraped in a white tray, visible worms were picked out and the faecal matter washed with sedimentations usually about 12, till no more worms were found. Search was not made for *Strongyloides* though these showed as larvae in nearly every stool examined in the laboratory while examination for schistosomes was limited to the microscopic investigation of material scraped from suspicious-looking patches on the mucosa of the bladder. Six of the cases were under 5 weeks old and had no parasites and of the remaining 114 the infection rate was just over 90 per cent. while in those over 15 months it was 96. There were 47 *Necator* infections with 1 870 worms in all the highest number in one person being 184 for *Ancylostoma* the corresponding figures were 22 368 and 147 for *Ascaris* 90 1 117 and 78 for *Trichuris* 72, 895 and 89. Of these worms the proportions of males to females varied from 1 to 1.5 in *Ascaris* 1 to 2 in *Trichuris* and *Ancylostoma* and 1 to 3 in *Necator*. *Taenia saginata* was present 4 times, whereas in Northern Nigeria the percentage of incidence is about 50 in the former area meat is little eaten. Schistosome eggs were found in 8. In a child of 1 month and 8 days there were 9 *Necator* and 147 *Ancylostoma* this is the only person who died as the direct result of infection and it is suggested that her mother must have set her down on the ground near a latrine [FOSTER (this Bulletin 1933 Vol 30 p 221) found that in pre-natal infection of a bitch with *A. caninum* eggs appeared in her pups faeces eleven days after infection great care having been taken to prevent their infection after their birth. *A. caninum* is very near to *A. duodenale* anatomically] Hookworm infections are held to be often an indirect cause of death. No *Enterobius* were apparently recovered from the lengths of intestine removed. C L

VAN DEN BERGHE (Louis) Les parasites intestinaux des pygmées Efé de l'Ituri (Congo Belge) [Intestinal Parasites of the Efé Pygmies of Ituri, Belgian Congo].—*Ann Soc Belge de Méd Trop* 1938 June 30 Vol 18. No. 2 pp 293-296

In spite of their timidity it was found possible to make faecal examinations on 42 male Efé pygmies of pure stock.

The pygmies live in symbiosis with the large negroid Bantus of the Walese race exchanging meat got by hunting elephant or the small antelope *Cephalophus* (the latter caught in nets after a beat by the women) for the agricultural produce of the Bantus. Every Walese village has its clan of pygmies living somewhere within 2 or 3 days march but at no fixed place. The faeces were examined by smear by centrifugal precipitation with washings and by [? gravity]

floatation in saturated salt solution. The percentages of infection found were *Ascaris* 22, *Necator* (established by getting the adults from washed stools) 40 *Trichuris* 27.5 and *Schistosoma mansoni* 11. No cestodes or *Strongyloides* were seen. One *Planorbis* was found after a long search in a small stream, and cysticerci were found in *Cephalophus* on two occasions. The percentages of infections found in the symbiotic Bantus were *Ascaris* 73 *Necator* 80 *Trichuris* 15 *S. mansoni* 27.5

C. L.

CLEMENT (L.) Contribution à l'étude du parasitisme intestinal chez les indigènes du territoire de Ruengeri (Ruanda) [On the Intestinal Parasites of the Inhabitants of Ruengeri (Ruanda)]—*Ann. Soc. Belge de Méd. Trop.* 1938, June 30 Vol. 18, No. 2, pp. 347-349

A report on examinations of faeces from 19,063 children between the ages of 2 or 3 and 15 or 16, the method of examination being unstated.

The percentages of detected infections were—*Ascaris* 94 *Trichuris* 72, "Taenia" 10.6 ankylostomes 1 *Strongyloides* 0.1 negative 4.3. Figures for the six different provinces are also given. The low percentage of hookworm infection is due to the cold climate. C. L.

LEATHERS (W. S.), KELLER (A. E.) & McPHERSON (W. A.) The Prevalence, Distribution and Intensity of Infestation of *Ascaris lumbricoides*, *Trichocephalus trichiura* [sic], *Hymenolepis nana*, *Enterobius vermicularis* and *Hymenolepis diminuta* in Fifty-Six Counties of Florida.—*Amer. J. Hyg.* 1939, Mar. Vol. 29, No. 2, Sect. D, pp. 57-66. [10 refs.]

This paper continues the report abstracted in this *Bulletin* 1938 Vol. 35 p. 669, this part dealing with the infections, other than those by hookworms, which were discovered by examination of 0.005 cc. of faeces by the Stoll-Hamshier method.

Of the 29,062 faecal specimens from white persons, there was detected *Ascaris* infection in 1.9 per cent, with an average intensity corresponding to 22,000 eggs per cc. and with highest figures in pre-school and school children. Of these 571 persons, 215 harboured unfertile eggs only, 159 fertile eggs only, and 197 both sorts, the eggs per cc. numbering 3,000, 15,000 and 58,000 respectively. When infection was familial its average weight, as measured by egg numbers, increased in each member of the family in proportion to the number of them which were infected. Of the 4,121 specimens from negroes 8.5 per cent. were positive with an average of 33,600 eggs per cc. and of these 268 persons there were unfertile eggs only in 78, fertile eggs only in 45 and both sorts in 145, the eggs numbering respectively 2,700, 18,000 and 56,000 per cc. For *Trichuris* the percentage of infections detected in white persons was 0.4, though it was as high as 11.9 in St. Johns County, and for negroes 0.19. For infection with *H. nana* the detected percentage was 0.9 in white persons and 0.16 in negroes, while for *H. diminuta* the corresponding figures were 0.06 and 0.12. C. L.

FONSECA (Rafael Calvo) KOURI (Pedro) & BASNUEVO (José G.)
 Porcentaje y distribución geográfica de la verminosis intestinal
 en Cuba. [Percentage and Local Distribution of Intestinal Worms
 in Cuba.]—*Rev Med Trop y Parasit* Habana. 1938 Sept.-
 Oct. Vol. 4 No 5 pp 231-261 With 5 figs. [29 refs]
 English summary

The method of diagnosis was to suspend a small piece of faeces in water by shaking to screen and centrifuge after adding a drop of acetic acid and to examine one preparation from the precipitate.

Of 7,246 examinations the percentages of infection discovered were Trichuris 37.44 Ascaris 16.86 Necator 5.97 Enterobius 2.16 Strongyloides 0.33 Taenia 0.2 *H. nana* 0.07 *F. hepatica* 0.04 *Entamoeba coli* 15.72 *Giardia* 4.25 *E. histolytica* 1.21 The local incidences are given and it is added that Taenia is most often found in resident Spaniards and Syrians and that Chinese show a high percentage of infection with Clonorchis no Cuban however being infected. C L

WALTER (E.) Studie neber die Verbreitung der Helminthen in der Bevölkerung Venezuelas. [The Distribution of Helminths in Venezuelans.]—*Ztschr f Parasitenk* 1938. Aug 19 Vol. 10 No 3 pp 432-435 With 1 fig

About half the material referred to in the title had already been investigated by Dr CHACIN ITRIAGO at Lausanne On his death his widow gave it to the Institute of Hygiene and Parasitology of that University and Professor GALLI VALERIO entrusted it to Walter for completion and report. It consists of 1,846 faecal specimens reported on in detail for geographical distribution in 707 and in general in 639 more. The percentages of infection discovered by the unstated method of diagnosis were respectively for these two sets of specimens — Ascaris 48.8 and 46.5 Trichuris 82.1 and 79.8 *Ancylostomum duodenale* 39.6 and 40.7 Ascaris and Trichuris 44.7 and 34.7 Ascaris and *Ancylostomum* 17.4 and 20.7 Ascaris, Trichuris and *Ancylostomum* 17.3 and 16.3 Taenia 1.55 and 0.9 and in addition there were 3 of *Schistosoma mansoni* 1 of lamblia, and 1 of a fourfold infection with Ascaris Trichuris *Ancylostomum* and Taenia. C L

DE ARAGÃO (R. Moniz) Incidência verminótica na população de João Pessoa. [Incidence of Worms in João Pessoa.]—*Brasil Medico* 1938. July 23 Vol 52. No 30 pp 679-680

From 1931 to 1937 the number of stools examined at the Central Laboratory of the Director General of Public Health of the State of Parahyba has been 4,972 with 74.5 per cent positive for worms the percentages of infection with different worms for these persons were Ascaris 51.7 Trichuris 31.2 Enterobius 19.0 Necator 14.8 Schistosoma 2.5 Of 830 persons classified by age the following figures hold. For 90 sucklings examined the infection rates were total 73 Ascaris 48.8, Trichuris 25.5 Enterobius 7.7 Necator 20 Schistosoma 0 for 495 of pre-school age the percentages were for all infections 82.8 Ascaris 70.6 Trichuris 27.3 Enterobius 49.2, Necator 7.2 Schistosoma 2.7 for other ages the percentages of infections in 246 examined were for all infections 77.6 Ascaris 41.0 Trichuris 24.8 Enterobius 10.5 Necator 22.5 Schistosoma 1.8 [It would have been valuable to learn the means of diagnosis which gave such a high percentage of Enterobius infections.] C L

ANDREWS (Mary V.) A Survey of Intestinal Parasites in Chinese Hospital Patients in Shanghai.—*Chinese Med J* 1938. Oct. Vol. 54 No. 4 pp 341-350 [10 refs.]

The result of 5,205 faecal examinations of 2,888 patients in Shanghai or 1.8 examinations per person instead of the 3 aimed at. The investigation covered a period of over 5 years. It was routine work in two-thirds of the specimens but in the other third the patients were selected for particular reasons.

For protozoa two films were examined under the oil immersion one in normal saline the other in double strength Gram's iodine solution. For helminths, one film was made in normal saline, one specimen was concentrated by hydrochloric acid and ether and one sedimented by Tomb and Helmy's method [this *Bulletin* 1932, Vol. 29 p 410] while for schistosomes the miracidia were hatched out. The table shows the numbers of positive findings.

Comparison of the different methods used for the detection of helminthic ova

Parasite	Total number of times found	Number of times found by each method			
		Direct smear	Concentration	Sedimentation	Faust & Meleney
<i>Ascaris</i>	218	183	142	142	
<i>Hookworm</i>	259	132	258	153	
<i>Trichuris</i>	375	163	364	178	
<i>Fasciolopsis</i>	28	13	13	24	
<i>Clonorchis</i>	15	7	14	9	
<i>Schistosoma</i>	354	67	82	172	325

The apparently favourable findings of *Ascaris* ova by direct smear are illusory for fertile eggs were more readily found by concentration and unfertile eggs by sedimentation and the combined positive results these gave exceeded those got by smear. In 107 cases adult hookworms were recovered, *A. duodenalis* in 80 *N. americanus* in 51 and both in 24. The high number of schistosome infections is due to faeces being sent for examination in nearly all suspected cases. *Taenia* eggs were found in 8 those of *H. nana* in 1 of *Enterobius* in 9 *Clonorchis* in 67 *Fasciolopsis* in 60 *Paragonimus* in 1 and *Heterophyes* in 1. For protozoa the corresponding figures were *E. histolytica* 128 *E. coli* 314 *E. nana* 239 *I. biluchii* 53 *G. lamblia* 144 *C. mesnili* 17 *Trichomonas hominis* 75 *Tricercomonas* 8 *Isospora hominis* 1. The percentage in which protozoa were discovered is 24 that for helminths 61. C. L.

NARIKARA (Norio) YUMOTO (Yoshika) OSAKA (Hiyoishi) & MAEDA (Toshimori). Intestinal Parasite Infections of Japanese and Formosan Chinese School Children in Taihoku City.—*Taiwan Igakkaï Zasshi* (*Jl Ved Assoc Formosa*) 1938. Oct. Vol. 37 No. 10 (403) [In Japanese pp 1581-1604 [45 refs.] English summary pp 1605-1606.]

Diagnosis was by examination of 8 smears from one stool passed by each person, 971 Japanese and 1,383 Formosan Chinese.

The material was concentrated by breaking up a few grams of faeces in about 10 cc. of normal saline centrifuging decanting and apparently repeating this process several times. A portion of the fine sediment thus obtained was examined in 6 smears 3 for helminths and 3 for protozoa. The Donaldson's eosin-iodine solution was also used for the identification of protozoan cysts. The percentage rates of infection found were for Japanese and for Formosan Chinese respectively: hookworm 1 2 2 Ascaris 22 25 53 56 Trichuris 22 14 37 78 Enterobius 1 65 1 54 Paragonimus 0 1 0 15 Metagonimus 0 21 0 *H. diminuta* 0 1 0 *H. nana* 0 0 0 7 *E. histolytica* 1 24 5 5 *E. coli* 3 39 8 29 *E. nana* 4 33 12 18 *I. blutschli* 0 31 0 81 *G. lamblia* 10 5 15 62 *T. hominis* 0 0 44

The results of this examination showed that the frequency of intestinal helminthic and protozoan infections of Formosan Chinese was much higher than that of Japanese but much less than that of Yokogawa and Wakushima a conclusion reported for several years ago. It demonstrates that the sanitary conditions of Formosan Chinese have been improved over these several years.

C. L.

Hsu (H. F.) Studies on the Food and the Digestive System of Certain Parasites. II. On the Food of *Schistosoma japonicum* *Paragonimus ringeri* *Dirofilaria immitis* *Spirocerca sanguinolenta* and *Rhabdias* sp.—Reprinted from *Bull. Fox Mem. Inst. Biol. Zool. Ser.* 1933 Oct. 20 Vol. 8 No. 4 pp. 347-368 With 32 figs (8 coloured) on 15 plates

BACILLARY DYSENTERY AND INTESTINAL PROTOZOAL INFECTIONS*

PRICES OF ABSTRACTS IN THIS SECTION

LIPPELT (p. 596) found Targem a complex colloidal preparation of silver to have a marked inhibitory action on cultures of the Shiga-Kruse Flexner and Sonne strains of *Bact. dysenteriae*. It is well tolerated by animals and in a clinical trial on four patients with dysentery it gave good results.

DORRILL (p. 597) describes the life history of *Entamoeba coli* and the process of excystation. The large "trophic" amoebae reproduce by binary fission without any evidence of a sexual process such as has been described. He discusses nomenclature and decides that *Entamoeba coli* is the correct name. TYZZER and GEIMAN (p. 598) found that *E. coli* in a patient had ingested red blood cells. Careful examination showed that they were not *E. histolytica*.

BOUGHTON and BYRD (p. 598) found that mixed intestinal protozoal infections occur too frequently to be accounted for by mere chance whereas mixed flagellate infections do not. SANGIORGI (p. 598) KESSEL and SINTSIN (p. 599) and KOURI *et al.* (p. 599) report on surveys of intestinal protozoa.

MACKENZIE and BEAN (p. 599) cured by means of methylene blue in an enema, a patient with diarrhoea due to *Balantidium coli*.

* For amoebic dysentery see this *Bulletin* 1939 Vol. 36, pp. 281-305

DE PAULA E SILVA (p. 599) reports cure of 9 patients by the giving of a strict milk diet, and of another by the administration of peroxyd. HSIUNG (p. 600) shows that *Balanulium coli* and *B. suis* occur in the pig and FISHER (p. 600) found that almost all the pigs in a district in Hungary were infected by one or the other.

In Buenos Aires, BACIGALUPO (p. 600) states that *Iodamoeba* infection occurs in 26-67 per cent. of pigs and in 1 to 2 per cent. in man, but apparently the *Iodamoebae* are distinct and pigs do not infect man. MOLLARY and AURULOVIC (p. 600) report cure of a patient infected with *D. fragilis* by emetine and trepanol.

CICCHITTO (p. 601) describes abnormal forms of *C. mairii* and CIFERRI and REDAELLI (p. 601) discuss the systematic position of *Blastocystis*.

Giardia infections—NARIHARA (p. 601) has estimated the survival time of *Lambia* cysts subjected to the action of various reagents.

PONTORI (p. 601) reports a case of enteritis in which *E. histolytica* and *G. lamblia* were found. FOURNIER (p. 602) quotes two cases in which *lamblia* were found by duodenal tubage. They were not responsible for the symptoms of the patients however since one was a case of schistosomiasis and the other of chronic appendicitis. DESCHREES (p. 602) holds that *lamblia* may be harmless commensals or definitely pathogenic but that the finding of *lamblia* in bile obtained by duodenal tubage is no proof that the bile passages are infected.

Treatment by salvarsan is advocated by BREUER (p. 603) DE PAULA E SILVA (p. 603) and v. FRIEDRICH (p. 603) who all obtained good results. LERTE (p. 603) uses entero-vioform orally with success.

The remainder of the papers report on the treatment of *Giardia* infection with atabrin (or quinaquine which is the same thing). All agree that it is most efficient in curing the condition quickly. The usual doses (of about 0.3 mgm. daily for 5 days) are advised and the flagellates often disappear after a few tablets. FALLA ALVAREZ *et al* (p. 605) consider that as various gastro-duodenal and nervous symptoms disappear following atabrin treatment, there can be no doubt that *lamblia* are pathogenic.

C Wilcocks

LIPPELT (Heinrich) Ruhrbacillen und Targemin. (Dysentery Bacilli and Targemin. —*Klin. Woch.* 1938. Apr 30 Vol. 17 No. 18 pp 636-637 11 refs.)

There exists considerable doubt regarding the use of serum therapy in bacillary dysentery so that an efficient intestinal disinfectant becomes very desirable. Such a substance should fulfil two purposes —

1. It should act upon the actual micro-organism of the disease.
2. It should in no way damage the tissues of the patient.

Targemin is a complex colloidal combination of albumin with the diacetyl-tannic acid silver salt. It is found to have no appreciable action upon the mucous membrane of animals and is well tolerated when administered by the mouth. It appears to be a suitable substance for bacillary dysentery. Favourable results have been recorded in the treatment of stomach and intestinal disorders. Albuminate of silver and diacetyl-tannin have both been used in intestinal therapy. A combination of these two substances is particularly well tolerated, whilst their antispasmodic and antidiarrhoeic characters are specially valuable for the treatment of dysentery.

Experiments were made on cultures of Shiga Flexner and Sonne as well as members of the typhoid and *Proteus* groups. In a dilution of 1 10 000 it exerted a lethal action within five minutes. Experiments were conducted both at room temperature and at 37°C in the incubator.

The inhibitory effect of Targedin was especially marked in the case of the Shiga Kruse, Flexner and Sonne strains. The conclusion arrived at is that the substance is specially suitable for the treatment of bacillary dysentery and bears out the reputation Targedin has already acquired in gonococcal infections.

In man a therapeutic trial has been made in four dysentery cases (Y and Sonne) given in doses of two tablets by mouth three times daily with favourable results. A carrier of the infection was also successfully cleared of organisms.

P H Manson Bahr

CASILLANOS (Agustín) *Entero-colitis sanguinolenta*. Estudio general (Haemorrhagic Entero-Colitis).—*Vida Nueva* 1939 Jan 15 Vol. 43. No 1 pp 1-95. With 18 figs. on 8 plates.

DOBELL (Clifford) *Researches on the Intestinal Protozoa of Monkeys and Man IX. The Life-History of Entamoeba coli with Special Reference to Metacystic Development*.—*Parasitology* 1938 June Vol 30 No 2 pp 195-239 With 61 figs. on 3 plates. [34 refs.]

In this paper the author describes with his accustomed care the life history of *Entamoeba coli* based on the cultural study of strains isolated from the marmoset species of *Macacus* and man and the experimental transfer from one to another of these hosts. It is noted that as regards the encysted stages the nucleus with its coarser chromatin and eccentric karyosome is the chief feature distinguishing *E. coli* from corresponding stages of *E. histolytica*. As is well known the mature cyst contains eight nuclei but before excystation the enclosed amoebae frequently lose some of the nuclei, to the number of one to four. Excystation is brought about by the retraction of the cytoplasm from the double wall of the cyst the formation of pseudopodia which stroke the wall till finally a considerable tear is made and the escape through the rupture of the multinucleated amoeba which without any nuclear divisions such as occur in the escaped amoeba of *E. histolytica* ultimately divides into uninucleated amoebulae. It will be recalled that the four-nucleated amoeba of *E. histolytica* escapes from its cyst through a small pore. The uninucleated amoebulae grow into the large trophic amoebae which reproduce by binary fission. At no stage in the development was there any indication of a sexual process such as has been described by certain observers.

The paper is illustrated by 61 figures in black and white arranged in three plates. On the excellence of these and on the lucidity with which every detail of the life cycle is discussed and described it is unnecessary to comment as the high standard of the author's publications is familiar to all his readers.

At the end of the paper in a Memorandum on the Genus *Entamoeba* Opinion 99 of the International Commission on Zoological Nomenclature is seriously questioned. By the decision of the Commission it is laid down that *Entamoeba* is a synonym of *Endamoeba* which was a genus founded by LEIDY for an amoeba of the cockroach. It is

argued that by this decision both *E. coli* and *E. histolytica* are referred to the genus *Endamoeba* an impossible position as no one has ever attempted to prove that the two human amoebae belong to the same genus as the amoeba of the cockroach. In arriving at their decision the Commission is shown to have gone "beyond their competence" so that if Opinion 99 is accepted some other generic name will have to be found for the human amoebae. The author's conclusion is that those who write *Endamoeba coli* can do so with a clear conscience as Truth and Reason and even the International Code are on their side.

C. M. Wenyon.

TYZZER (Ernest E.) & GETMAN (Quentin M.) The Ingestion of Red Blood Cells by *Endamoeba coli* and its Significance in Diagnosis.—*Amer. J. Hyg.* 1938 Sept. Vol. 28 No. 2 pp. 271-287. With 35 figs. on 2 plates. [22 refs.]

In a case of intestinal obstruction due to a papillomatous polyp of the sigmoid a blood-streaked mucous discharge was observed and in it were seen numerous amoebae with included red blood cells. A careful study of the amoebae, including culture and inoculation of kittens, failed to provide any evidence of the existence of *Endamoeba histolytica*. Everything pointed to the amoeba being *E. coli* so that it became evident that this was a case in which *E. coli* was actively ingesting red blood corpuscles in the intestine. It is pointed out that if the presence of red blood corpuscles in the amoebae had been accepted without any further evidence as sufficient for the diagnosis of an *E. histolytica* infection a mistake would have been made which might have condemned the patient to an unnecessary and costly course of treatment.

The paper is illustrated by three dozen microphotographs showing the characters of the amoebae and their cysts. They leave no doubt as to the correctness of the conclusions drawn.

C. M. W.

ROSAFELD (Gastón) O valor zoonológico da ameba coli. [The Significance of *E. coli*—Arch. Prazis de Med. Cirurg. y Especials. 1938 Feb. Vol. 1^o No. 2 pp. 157-159.]

BURGHT (Donald C.) & BYRD (Elton E.) On the Incidence of Mixed Infections with Intestinal Protozoa.—*Amer. J. Hyg.* 1938 Jan. Vol. 27 No. 1 pp. 88-94.

It is well known that in surveys of groups of people for intestinal protozoa a number of mixed infections always occur. By a statistical analysis of the results of two such surveys the authors have shown that the occurrence of mixed amoebic infections is too frequent to be accounted for by mere chance. The same remark applies, but less definitely, to mixed amoebic and flagellate infections, whereas mixed flagellate infections occur only as frequently as can be expected from a chance distribution.

C. M. W.

VANGIORGI (G.) Forme rare di protozoi intestinali nelle Puglie. Rare Intestinal Protozoa in Puglie.—*Pathologica* 1938 Oct. 15 Vol. 30 No. 564 pp. 421-422. [13 refs.] English summary. (5 lines.)

In examinations of stools carried out in Puglie, Italy, the author has met with the following intestinal protozoa—*Endolimax nana*, *Endamoeba bütschlii*, *Dientamoeba fragilis*, *Pentastrichomonas intestinalis* and *Isofovea bigemina*.

C. M. W.

KESSEL (John F.) & SINTSYN (D.) A Survey of Intestinal Protozoa among Children and Adults in Los Angeles.—*Jl Parasitology* 1938 Oct Vol. 24 No 5 pp 433-436

The survey was based on the examination of 585 adults seeking work as kitchen employees in the Los Angeles County Hospital 753 adult clinic patients seeking medical attention for conditions other than gastro-intestinal in nature and 678 children from a Los Angeles City Juvenile Detention Home. In the first group six consecutive daily stools were examined while in the other two groups only a single one following a saline purge was examined. The findings are given in a table which separates the males from the females. The results resemble other similar surveys but show various minor variations which the authors indicate in their text. Of 2016 persons examined 33.7 per cent showed positive results. *E. histolytica* was found in 3.3 per cent. *E. nana* in 11.0. *D. fragilis* in 1.7 and *Giardia* in 4.8 per cent.

C M W

KOURI (Pedro) BASQUEIRO (José G.) SOTOLONGO (Federico) & ANIDO (Vicente) Las protozoosis intestinales en la ciudad de la Habana. [Incidence of Intestinal Protozoa in Havana.]—*Rev Med Trop y Parasit Habana* 1938, Sept-Oct Vol. 4 No 5 pp 271-273

The paper gives the results of the examination in Havana of 8143 samples of human faeces for intestinal protozoa. All the forms were discovered and these were present in the usual proportions.

C M W

MACKENZIE (D. L.) & BEAN (H.) Balantidial Dysentery.—*Lancet* 1938, Jan 8 pp 84-85 With 2 figs

About six months after admission to the County Mental Hospital, Ramhill, a female patient 31 years of age was found to be suffering from diarrhoea due to *Balantidium coli* infection. In attempts to stain the living ciliates with Löffler's methylene blue it was observed under the microscope that as they took up the stain their movements ceased. Accordingly the case was treated by running into the large intestine two pints of the stain after the colon had been washed out. The treatment was repeated the next day. Free ciliates were no longer found but gradually diminishing numbers of cysts were passed for a fortnight when the treatment was repeated. No further ciliates or cysts could be detected. The source of the infection could not be traced there having been no association with pigs. The statement made by the authors that infection may occur through eating diseased flesh is incorrect.

C M W

DE PAULA E SILVA (Geraldo Siffert) Balantidíase humana aspectos clínicos e terapêuticos. [Balantidial Infection.]—*Brasil-Médico* 1938, Nov 5 Vol. 52, No 45 pp 1005-1015 With 2 charts [31 refs.] English summary

Two cases of balantidiosis are detailed and the author refers to eight others in which after the usual forms of treatment by yaler emetin etc. had proved unavailing the giving of a strict milk diet, 350 cc. six times a day was followed soon in all but one by

disappearance of the parasite and of the clinical signs. In the exception there was clinical improvement, though the protozoon could still be seen on faecal examination. To this patient paroxyl (4-oxo-3-acetylamino-phenylaridic acid) was given the diarrhoea ceased and the *Balantidia* could no longer be seen. H H S

HSIUNG (Tsuen) Biometrische Untersuchungen an den *Balantidien* des Schweines in der Kultur [Biometric Studies on Pig *Balantidia* in Culture.]—*Ztschr f Parasitenk* 1938. Apr 2. Vol. 10 No 1 pp. 108-131 With 3 figs. [29 refs.]

Biometric studies on various races of *Balantidia* from pigs have shown that McDONALD's contention made in 1922 that two species of the ciliate occur in these animals is correct. These are *Balantidium coli* and *B. suis* the former being of larger average dimensions than the latter. C M IV

FÜSTHY (O) Untersuchungen ueber das Vorkommen der *Balantidiosis* in Ungarn [Incidence of *Balantidial* Infection in Hungary]—*Zent f Bak* I Abt. Orig. 1938 Aug 18. Vol. 142. No 3/4 pp. 133-137

Working in Hungary the author has found that practically every pig in the district examined is infected with *Balantidium*, of which two species *Bal. coli* and *Bal. suis* are present. An examination of 160 persons revealed an infection in only one individual 65 years of age. This infection, which gave rise to no symptoms, was undoubtedly acquired through contact with pigs. C M IV

BACIGALUPO (Juan) Algunas consideraciones sobre la *Iodamoeba butschlii* [Notes on *Iodamoeba butschlii*]—*Rev Med. Trop y Parasit Habana* 1938 May-June Vol 4 No 3 pp 141-146 With 2 figs on 1 plate

It is found that *Iodamoeba* infection occurs in 23-67 per cent. of pigs in Buenos Aires. It is evidently a common infection in these animals as it has been found in all countries in which it has been looked for. As regards human beings in Buenos Aires the *Iodamoeba* infection rate varies from 1 to 2 per cent. There is no relation between infection and occupation, certain individuals who have tended pigs for 20 years being free from infection. Attempts to infect pigs with cysts of human origin failed, though success was obtained with cysts from infected pigs. It seems that though the human and pig *Iodamoeba* are identical morphologically they are actually distinct so that pigs play no part in the spread of the human infection. C M II

MOLLARI (Mamo) & ANZULOVIC (J V) Cultivation and Pathogenicity of *Disentamoeba fragilis* with a Case Report.—*JL Trop Med & Hyg* 1938 Aug 1 Vol 41 No 15 pp 248-247

From the stools of a case of repeated intestinal haemorrhage associated with thickening in the right iliac region an amoeba identified as *Disentamoeba fragilis* was cultivated. It was maintained for 180 sub-cultures. In stained films only unimaculate amoebae were seen. The patient who had been ill for a long time was treated with emetine.

hydrochloride and treparsol for four days. A week later the course was repeated. The result was an immediate improvement followed by disappearance of the infection and return to good health. C M W

CICCHITTO (Angelo M) Su alcune alterazioni morfologiche del *Chilomastix mesnili* [Morphological Changes in *Chilomastix mesnili*]—*Ann d Igiene* 1938 Sept-Oct Vol 48. No 9-10 pp 548-554 [14 refs.]

The author describes an infection due to *Chilomastix mesnili* and notes that the flagellates are often of an abnormal or amoeboid form. He considers the possibility of the flagellate being a new species but very wisely concludes that it is actually *C. mesnili*. As a matter of fact the forms described by the author are of very common occurrence and are well known as deformed specimens to those who have experience of the flagellate. A plate in black and white illustrates the various types referred to. C M W

CIFERRI (R.) & REDAELLI (P) A New Hypothesis on the Nature of Blastocysts—*Myopathologia* The Hague 1938. May 9 Vol. 1 No 1 pp 3-6 [34 refs.]

This is a discussion of the systematic position of *Blastocystis* which everyone nowadays regards as a vegetable organism of a fungoid nature. The authors conclude that it has affinities with the unicellular achloric Autosporineae amongst the algae and they propose including them in the family Protothecaceae Printz amongst the Oöcystaceae.

C M R

CHODZKO (W) Lambliase en Pologne. [Giardia Infection in Poland.]—*Bull Office Internat d'Hyg Publique* 1939 Mar Vol 31 No. 3 pp 456-470 With 3 figs on 2 plates. [32 refs.]

NARIHARA (Norio) Resistance Tests of the Cysts of *Giardia lamblia*—*Taiwan Igakkaï Zasshi (Jl Med Assoc Formosa)* 1938. May Vol. 37 No. 5 (398) [In Japanese pp 823-830 [34 refs.] English summary pp 836-837]

By use of the eosin test which is based on the assumption that live cysts do not stain when brought into a solution of the dye the author has determined the survival time of lamblia cysts when subjected to the action of a number of reagents such as mercuric chloride alcohol carbolic acid, calcium hypochlorite etc of varying concentration.

C M Wenyon

PONTONI (L.) Dictosarcomatosi (reticulosarcomatosi) regionalizzata e tubercolosi delle linfoghiandole mesenteriche in lambliaoamebiasi [Generalized Reticulosarcoma and Tuberculosis of Lymphatic Glands associated with Giardial and Amoebic Infection.]—*Patologica* 1937 Oct 15 Vol. 29 No 532 pp 415-424 With 6 figs. on 2 plates. [35 refs.] English summary (5 lines)

The paper describes a complicated case of enteritis associated with enlargement of the mesenteric glands and infection with *Eutamoeba*

histolytica and *Giardia lamblia*. At autopsy a follicular enteritis was discovered while microscopical examination of the glands revealed both tubercular and malignant changes. The relationship of the pathological condition to the protozoal infections is discussed.

C M IV

FOURQUER (J) A propos des manifestations extra-intestinales de la lambliose. [Extra-Intestinal Manifestations of *Giardia* Infections.] —*Bull Soc Path Exot* 1938 Oct 12 Vol. 31 No 8. pp 716-720.

The author comments on the modern tendency of many physicians to attribute all manner of symptoms to the presence of *lamblia* in the intestine. The procedure of duodenal tubeage which is practised with increasing frequency is bringing to light many infections which otherwise would have remained undetected, while the presence of flagellates in the bile withdrawn from the duodenum is regarded as sufficient evidence of the invasion of the biliary passages and gall bladder by the flagellates. It is pointed out that there is little justification for this last conclusion. Without denying any pathogenic properties to the *lamblia* under certain conditions, the author quotes two cases which are most instructive in this connexion.

The first case, from Shanghai, was that of a child 8 years of age suffering from hypertrophic cirrhosis of the liver, splenomegaly and ascites. All the usual investigations gave no clue to the cause of the condition till duodenal tubeage revealed an enormous *lamblia* infection. The local medical men were inclined to see in this infection the cause of the trouble. Further faecal examinations were made and finally eggs of *Schistosoma japonicum* were found and the diagnosis established.

The second case was that of a French soldier in Shanghai who suffered from attacks of pain in the right hypochondrium. The pain extended over the abdomen, while the liver was abnormally sensitive. In this case examination of the stools revealed only *lamblia* cysts, while by duodenal tubeage enormous numbers of the flagellates were shown to be present in the duodenum. Various treatments were tried to rid the patient of his *lamblia* infection but without result. Finally administration of quinacrine (atebrin) proved successful and the flagellate infection was eradicated. The symptoms, however persisting, surgical interference was advised. There was thus discovered a chronically diseased appendix which was retrocaecal in position and situated high up in the abdomen.

In both these cases there had been an inclination to attribute the symptoms to a *lamblia* infection and in both it was possible to discover the cause to be quite of another nature.

In a discussion following the presentation of the author's paper M. R. DESCHAMPS emphasizes the author's point of view and notes that, as in other intestinal protozoal infections, the *lamblia* may be present as harmless commensals on some occasions while on others they may be definitely pathogenic. He agrees that their presence in bile obtained by duodenal tubeage is not proof of invasion of the bile ducts or gall bladder.

C M IV

BREUER (Anneliese) Die Symptomatologie und die Behandlung der Lamblien Infektion des Menschen. [Symptomatology and Treatment of Giardia Infection in Man.]—*Arch f Schiffs u Trop Hyg* 1938. May Vol. 42. No 5 pp 201-222. With 3 figs. [93 refs.]

This is a long paper based on 104 cases of lamblia infection studied at the tropical convalescent home at Tübingen from 1929-1937. An extensive literature of the subject is reviewed and a long list of references given. Of the cases treated 26 became free of infection while 38 though cured clinically still harboured the flagellate. From the point of view of treatment the best results were obtained with arsenicals—spirocid or salvarsan. In some cases it was difficult to gauge the pathogenicity of the flagellate which occurred in 20 per cent of the cases without any symptoms and in 50 per cent in association with amoebae. C M II

DE PAULA E SILVA (Geraldo Siffert) Novos estudos sobre a giardíase [New Studies on Giardia Infections.]—*Brasil Medico* 1938. Jan. 15 Vol. 52. No 3 pp 67-73 [11 refs.]

The author who considers that *Giardia lamblia* is pathogenic and parasitizes not only the duodenum but also the biliary passages, describes the symptoms which he attributes to this flagellate infection and the successful treatment of thirty three cases by injections of full doses of neosalvarsan followed by the oral administration of stovarsol and in some cases yatren. C M III

1. FRIEDRICH (L.) Die pathogenetische Bedeutung der *Lamblia intestinalis* [Pathogenic Importance of *Giardia lamblia*]—*Klin Woch* 1938. Apr 23 Vol. 17 No 17 pp 605-608

This is a long discussion on the pathogenicity of *Giardia lamblia* from which it is concluded that every sick person found to be harbouring the flagellate must be energetically treated. There is no certain cure for the condition the best results being obtained by intraduodenal introduction of salvarsan and duodenal lavage. C M IV

LEITE (Moacyr Renault) Tratamento da cholecistite de origem lambliótica. [Treatment of Cholecystitis due to Giardia Infection.]—*Folha Med* 1937 May 15 Vol. 18. No 14 pp 220-222.

The author assumes that certain cases of cholecystitis are due to lamblia infections as proved in his opinion by the discovery of flagellates in material collected by duodenal tubage. To treat the condition he has employed entero-vioform (iodo-chlor-oxyquinolin) orally. Three tablets (each containing 0.25 gram) are given daily. Successful results are reported. C M IV

GALLI VALERIO (B.) La lamblíase et son traitement par l'atébrine [Atebrin Treatment of Giardia Infections.]—*Schweiz Med Woch* 1937 Dec 11 Vol. 67 No. 50 pp 1181-1182. [19 refs.]

The author believes that the good results he has obtained in the treatment of lamblia infections by oral administration of atebriin have completely solved the difficult problem of the chemotherapy of this condition. C M IV

MARTIN (Pierre) Le traitement de la lamblïase par la quinacrine. Résultats d'une expérience de près de deux années. [Quinacrine Treatment of *Giardia Infection*.]—*Rev Méd et Hyg Trop* 1938. Jan.-Feb. Vol. 30 No 1 pp 32-39

Since GALLI VALERIO first announced the successful treatment of lamblia infections with atabrin a number of observers have reported favourably on the action of the drug. In the present paper the author reviews the literature on the subject and gives an account of his own experience of the use of quinacrine, the French equivalent of atabrin. He reports that the drug, orally administered, cures patients of both lamblia and trichomonas infections and that when given in solution as a vaginal douche it is active against *Trichomonas vaginalis*.

C M H

TANGUY (J.) Traitement de la lamblïase par la quinacrine. [Treatment of *Giardia Infection* with Quinacrine.]—*Bull Soc Path Exot* 1937 Oct. 13 Vol. 30 No 8 pp 683-694

The author writes in favour of quinacrine as a remedy against lamblia infection. The treatment consists in taking by the mouth three times a day at meal times for five days a tablet of 0.1 gram of the drug. After a rest of five days the course is repeated. This is done a third or even a fourth time if necessary. The statement is made that the drug is as active against the cysts as against the free forms, a remark which seems to imply that the cysts and free forms represent separate infections. It would be equally logical to state that in an ankylostome infection a drug was active against the eggs as well as against the worms. In all such cases a drug which destroys the free forms will lead automatically to disappearance of cysts & eggs, since there are no longer any free forms to produce them. C M H

HELMANN (Karl) Die Behandlung der Lambliosis mit Atebrin. [Treatment of *Giardia Infections* with Atebrin.]—*Munch Wch* 1938 Oct 21 Vol. 85 No. 42 pp. 1628-1629. [14 refs.]

The author has successfully treated a series of thirteen cases of lamblia infection by oral administration of atabrin. Relatively small doses such as 0.1 to 0.2 gm. three times a day for three days are usually sufficient to get rid of the flagellates. The results are superior to those obtained by intravenous injections of neosalvarsan, which was also tried in a series of cases.

C M H

GRUENZ (Paul) Zur Therapie der Lambliosis. [Therapy of *Giardia Infections*.]—*Wien Klin Wch* 1938 June 3 Vol. 51 No 22 pp 605-606. 13 refs.

The author writes in favour of the atabrin treatment of lamblia infections, which is not only easy to carry out and free from danger but also certain in its results.

C M H

PURGES (O.) Zur Symptomatologie und Therapie der Lambliosis. [Symptomatology and Therapy of *Giardia Infections*.]—*Med Klin* 1938 Apr 29 Vol. 34 No 17 (1740) pp 580-582.

For the treatment of lamblia infections which are discussed at length in the paper the author advocates a five-day course of atabrin.

followed by a daily dose for a month of dermatol (bismuth subgallate) and a six months régime of food which is poor in cellulose and the avoidance when symptoms referable to gall bladder trouble are present of all highly seasoned and irritating food and drink.

C M W

ROMANO (Nicolas) REY (Simon) & MEILLER (Enrique) *Giardiasis intestinal formas clinicas y tratamiento* [Treatment of Giardia Infections.]—*Prensa Méd Argentina* 1938 Sept 14 Vol. 25 No 37 pp 1725-1730 [44 refs.]

In a series of 800 cases in which duodenal tubage was practised lamblia infection was detected in 80. It is concluded that the flagellate is definitely pathogenic but that if it ever invades the biliary passages it does so only exceptionally. As regards various treatments that have been tried these were far from satisfactory till atabrin was employed. In the first case a remarkable result was obtained and this was followed by the successful treatment of twenty further cases. Atabrin thus affords an easy and ready means of destroying the flagellates which often disappear after the first dose of two tablets of the drug.

C M W

BACIGALUPO (Juan) *Algunas consideraciones sobre giardiasis y su tratamiento.* *Giardia Infection and its Treatment.*—*Arch Argentinas Enferm Aparato Digest y Utric* Buenos Aires 1937 Oct.-Nov Vol 13 No 1 pp 5-16. [16 refs.]

The paper describes the treatment of a number of cases of lamblia infection by the oral administration of atabrin. It is claimed that the drug is extraordinarily efficacious in eradicating infections with this flagellate.

C M W

FALLA ALVAREZ (Laureano) SILVEIRA (Rafael) & BERNARDINO (Santiago) *El tratamiento de la lamblasis por la atabrina. Consideraciones clinicas y terapeuticas.* [Atabrin Treatment in Giardia Infections.]—*Ida Nueva* 1938 May 15 Vol 41 No. 5 pp 320-330 [19 refs.] English summary

The authors point out that various gastro-duodenal and nervous symptoms are attributable to lamblia infections for which hitherto no specific remedy was available. The loss of the infection, and with it the disappearance of symptoms following atabrin treatment would appear to settle once for all any doubts which exist regarding the pathogenicity of these flagellates.

C M W

KOURI (Pedro) BASQUEVO (José G.) SOTOLONGO (Federico) & ANIDO (Vicente) *Tratamiento de la lamblasis por las sales de acridina.* [Atabrin Treatment of Giardia Infections.]—*Rev Méd Trop y Parasit* Habana 1938 Sept.-Oct. Vol 4 No 5 pp 279-283

It is noted that infections due to lamblia are very common in Cuba. Twenty three cases were treated and all were cured by the use of atabrin.

C M W

BACIGALUPO (Juan) Tratamiento de la giardiasis. [Treatment of Giardia Infection.]—*Rev Med Trop y Parasi.* Habana. 1936 Sept.-Oct. Vol. 4 No. 5 pp 285-293. [16 refs.]

The paper gives notes of 25 cases of lamblia infection which were cured by oral administration of atabrin. C M W

REVIEWS AND NOTICES.

ROGERS (Leonard) [K.C.S.I., C.I.E. LL.D. M.D. B.S. F.R.C.P., F.R.C.S. F.R.S. etc.] & MEGAW (John W. D.) [K.C.I.E. B.A. M.B. Hon D.Sc. (Queen's University Belfast) etc.] *Tropical Medicine*. Third Edition—pp xii+544 With 2 coloured plates & 87 text figs 1939 London J & A. Churchill Ltd., 104 Gloucester Place Portman Square [16s.]

The third edition of this standard text-book maintains the same order as previous editions. Certain diseases in the order of their exposition, are classified rather on account of the symptoms and signs they produce than on account of the aetiological agents. Thus amoebic hepatitis is included with malaria kala azar and trypanosomiasis in the section on febrile diseases caused by protozoa, but amoebic dysentery is in the section of bowel diseases with symptoms of dysentery and diarrhoea, and oriental sore is in the section dealing with diseases with the most prominent lesions on the surface of the body.

The historical introductions to the diseases have been retained and give the student an idea of the immense progress in the understanding of tropical disease which has taken place in the last half century. Although the number of pages is about the same as in the second edition, a considerable amount of new material has been added, permitted partly by excision and partly by an increase in the letter press on each page though the type is unchanged.

Much recent work is mentioned, for instance the sulphanilamide treatment of undulant fever the treatment of plague with human convalescent serum, and the nicotinic acid treatment of pellagra. Justice is done to recent work on the complex bacteriological problem of cholera, the use of vaccines of living avirulent plague bacilli in Java and Madagascar is mentioned, and the modern conceptions of yellow fever and jungle yellow fever are set out. Crowden's work on the heat insulation of buildings is referred to. The treatment of malarial splenomegaly by adrenalin after the manner of Ascoli is not mentioned however nor is Henry's melanoflocculation test for that disease though it is referred to in kala azar. The section on diseases caused by venomous animals is, as before, confined to snakes.

The classification of the typhus group of fevers according to the vectors has been retained and is undoubtedly the most useful, and a brief account of trench fever not as a member of this group but as a disease regarded as caused by a Rickettsia body has been added. Dengue and sandfly fever are again classed as mosquito dengue and sandfly dengue which makes for clarity. A fuller list of vitamin-containing foodstuffs is given.

The useful sections on general diseases in the tropics are retained and serve to remind students that their interest should not be centred

too exclusively on tropical diseases *sensu stricto*. This is especially so in the case of tuberculosis which is becoming more and more of a problem throughout the hot countries of the world.

The sections on the use of the microscope and on case taking are again included and throughout the diagrammatic representations of the phases of diseases introduced into previous editions are continued.

The book is more than a text-book, it is a work of reference which will be valuable to any practitioner in the tropics as the rapid exhaustion of the second edition shows and it possesses a distinction arising from the fact that the authors who have already assumed their place in the history of British tropical medicine write with the first-hand knowledge acquired during many years of practical experience and enquiry

C IV

SHATTUCK (George Cheever) [Harvard School of Public Health] with the collaboration of Joseph C. BEQUAERT Jack H. SANDGROUND Margaret M. HILFERTY & Samuel Drury CLARK. *A Medical Survey of the Republic of Guatemala.*—pp xi+253. With 76 tables 5 graphs 2 plates (maps) & 1 fig. 1938. Washington. Carnegie Institution of Washington.

This medical survey organized and directed by the Department of Tropical Medicine of the Harvard School of Public Health was carried out in 1932 under the auspices of the Carnegie Institution of Washington. It is, as may be surmised a well-documented survey containing no less than 76 tables and will doubtless be for many years the chief source of information for English readers on medical matters in Guatemala.

The population of Guatemala estimated at 2½ millions consists as to 65 per cent. of Indians and 35 per cent. of Spanish-Indians called ladinos or Latins.

Dr Shattuck writes on the infectious diseases, including malaria leishmaniasis syphilis and yaws and other topics such as anaemia in the highlands goitre pulse rates and blood pressures.

Dr Hilferty deals with statistics Dr Sandground with helminthic infections Dr Bequaert with arthropods and the distribution of *Phlebotomus* in South and Central America. Dr Clark has a short chapter on the diseases of the Peten District. Latins have higher birth-rates and death-rates than Indians but this may be due to better reporting.

As to the history and probable origin of the infectious diseases of Guatemala yellow fever was first recorded in 1859 and the last epidemic was in 1924. Tests show the presence of resistant individuals. Cholera has not been seen since 1857 and plague has never been established. Shattuck believes that nearly all the more deadly epidemic diseases known in the New World since its discovery by Columbus have been imported from the Old World within historic times.

A study of 812 patients examined in the highlands is tabulated. It includes 29 pellagrins. The study was designed to throw light on the prevalence of syphilis of which 28 cases were recognized. The chief problem of the Peten District is the prevalence of chancro ulcer a form of leishmaniasis acquired by the gatherers of the basic material of chewing gum. Malaria is a major sanitary problem. *A. albimanus* is the most dangerous vector. Leishmaniasis in America is fully

discussed. The presence of autochthonous cases was not recognized with certainty till 1909 when the causal organisms were found. There is a close correlation between its distribution and that of species of *Phlebotomus* which bite man. No case of visceral leishmaniasis has been found. Syphilis is treated at some length. A positive diagnosis was made in twice as many Latins as Indians and the portion of complete clinical latency was high in both races. Shattuck did not encounter yaws, but it has been reported.

In regard to the helminthic infection of Guatemala all the cosmopolitan parasites are present and both species of hookworm but no *Wuchereria bancrofti* or *Schistosoma*. According to table 78 reproduced from a Guatemalan journal ankylostomiasis is second on the list as a cause of death, coming between malaria and pneumonia. The source of *Onchocerca volvulus* in this country is not clear. It is not found elsewhere in Central and South America.

In the concluding chapter by Dr. Shattuck in which health problems are discussed the activity of the Health Services is apparent. Smallpox is so well controlled by vaccination that the mortality from it is no longer significant. The book is indexed and contains two useful maps.

A. G. Bagshawe

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES
BULLETIN.

Vol. 38.]

1939

[No. 8

SUMMARY OF RECENT ABSTRACTS

VII HELMINTHIASIS *

General

SCOTT and HEADLEE (p. 672) as a result of a study of the weights of series of consecutive stools consider that correction of helminth egg count figures for the consistency of the stools is unnecessary but hold that in published papers the figures for both corrected and uncorrected data should be made available for comparison with other work.

In the examination of stools for helminth ova GALLIARD *et al* (p. 267) find a double gravity precipitation technique superior to sugar Telemann's and Garin's methods. LEE (p. 216) employs an enrichment fluid of acetic and hydrochloric acids formal and distilled water with which faeces are mixed before centrifuging.

ARTIGAS (p. 218) uses a mastic-cresote fluid after treatment with acetic acid and cresote for the mounting of helminths and small arthropods.

HUKUDA and AKI (p. 218) report that ordinary rinsing does not remove the various ova found on *Tukemona* sold in markets.

HALPÉRINE (p. 670) shows that rise of temperature and loss of moisture in a mixture of faeces and peaty material causes destruction of *Ascaris* and *Trichuris* eggs.

COCHAUX (p. 669) describes *nzadi* or *lupusu* as a syndrome of heavy hookworm or *Ascaris* infection combined with avitaminosis.

The following list of the percentages of helminthological findings detected in surveys by the use of methods of varying accuracy has been constructed from the abstracts in this section —

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1938 Vol. 35. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

Author	Page	Country	No examined	Hicoria occ.	Acarus	Tineurus	Pterobius	Stenodermes	Tanais	H. nana	H. dimidiata	S. japonicum	C. elmsi	F. buckii	E. histolytica	Gardia	Trichomonas
Newjean	217	Korea	13 460	11.9	35	25	-	-	9.3	-	-	-	-	-	-	-	-
Legendre	217	Cambodia	361	54	30	9	-	9	-	-	-	-	-	-	-	0.8	-
Galliard et al	267	Hanoi	500	21.05	64	55	1	1.57	0.8	-	-	-	0.8	-	2.37	12.4	-
Crenn	593	New Caledonia	425	77	-	11.7	-	6.9	-	-	-	-	-	-	-	-	-
May	633	Baden	828	-	17.6	12	0.84	-	0.12	0.7	0.008	-	-	-	-	-	-
Keller et al	639	N Carolina	37,343 (whites) 6 301 (negroes)	-	9.5	0.5	0.7	-	-	0.27	0.06	-	-	-	-	-	-
Irving & Teach	218	Celebes	88	35	3	-	-	-	-	-	-	8	-	-	-	-	-
McCoy & Chu	221	China	349	0.6	49	19	-	-	-	-	-	-	-	85	-	-	-

Translodes.

Schistosomiasis—In the Sudan (p. 266) it is reported that infection with schistosomes has declined remarkably during the last ten years.

DOWDESWELL (p. 590) found *Physopsis nasuta* and *Bulinus forskali* to be hosts of *S. haematobium* in Kenya. *Ph. nasuta* is the host for *S. bovis*. ZAVATTARI (p. 665) shows that the distribution of *Bulinus contortus* and vesical schistosomiasis in Libya correspond. In India DE NELLO (p. 596) considers *Melanoides tuberculatus* and *Limnaca luteola pinguis* to be hosts of *S. haematobium* and describes an autochthonous human case.

SHAW and GHAREEB (p. 665) draw attention to the importance of pulmonary damage in schistosomiasis. In 282 autopsies on persons infected there were lesions in the lungs of 33 per cent and in 2 per cent these were the cause of death. Embolism by ova from extra pulmonary worms may cause parenchymatous tubercles in which the ova escape from the arterioles. focal arterial lesions consisting of necrosis of intima and media following impaction with capillary formation and hypertrophy of the proximal muscle coat and Ayerza's disease consisting of rows of tubercles in the lumen of the vessels caused by repeated embolisms. The latter gives the appearance of strands of silver wire throughout the lungs and the lesions result in hypertrophy of the right heart. In 10 instances the actual worms were found in the pulmonary vessels.

MAKAR (p. 268) describes the appearances of congestive and atrophic lesions of schistosomiasis in the prostatic urethra as seen through the urethroscope. From a study of the literature BOGLIOLO (p. 260) concludes that *S. haematobium* is found unusually often in cancer of the bladder which is probably caused by the irritation of the eggs. *Cysticercus fasciolaris* and adult *Gongylonema neoplasticum* are associated with cancer in animals.

With reference to treatment by foudin DIAMANTIS (p. 599) reports the death of a child treated for *S. haematobium* infection. The death was due to antimony poisoning and he estimates that 2 000 persons are killed by antimony poisoning every year in Egypt. Since tartar emetic is largely used in treatment the author disagrees with the suggestion advanced by KHALIL of examining the urine for pyrocatechin (contained in foudin) as a measure of tolerance. It is also not certain that the proportions excreted by bowel and kidneys are constant. The author advises that no more than four antimony injections be given in all amounting to 0.18 gram of antimony and thereafter emetine should be administered.

GAUNDER (p. 220) suggests that foudin may have the effect of lessening the clotting power of the blood and that therefore operations should not be performed until at least four weeks after the completion of a course of this drug.

SERRA (p. 219) reports good results in the treatment of 15 cases of intestinal and vesical schistosomiasis by dicuprene intravenously, paludex orally and a combination of the two but prefers oral paludex. CAWSTON (p. 599) failed to cure two patients by administering cuprochin by the mouth.

KHALIL and AZIM (p. 665) show that the introduction of perennial irrigation in Egypt has resulted in an enormous increase in the number of infections by *S. haematobium*. Canals are now to be cleaned yearly, outflows to drains are to be made and dead ends abolished. BUCHANAN

Author	Page	Country	No examined	Percentage											
				H. c. c. c.	A. c. c.	T. c. c.	E. c. c.	S. c. c.	T. c. c.	H. c. c.	H. c. c.	H. c. c.	S. c. c.	C. c. c.	P. c. c.
Neufman Legrand Galliard et al Crenin	217	Korea	13 460	11.9	35	22.9	—	—	—	—	—	—	—	—	—
	217	Cambodia	361	64	30	—	—	—	—	—	—	—	—	—	—
	257	Hanoi	590	21.05	64	35	—	—	—	—	—	—	—	—	—
	593	New Caledonia	428	77	—	11.7	—	—	—	—	—	—	—	—	—
May Keller et al	603	Baden	828	—	17.6	12	0.84	—	—	—	—	—	—	—	—
	600	N. Carolina	37,346 (whites) 6,301 (negroes)	—	9.5	0.6	0.7	—	—	—	—	—	—	—	—
Brug & Touch McCoy & Chin	218	Celebes	96	—	22.5	3	0.03	—	—	—	—	—	—	—	—
	221	China	349	35	48	19	—	—	—	—	—	—	—	—	—

Trematodes

Schistosomiasis—In the Sudan (p. 266) it is reported that infection with schistosomes has declined remarkably during the last ten years.

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KHALIL and AZIM (p. 665) show that the introduction of perennial irrigation in Egypt has resulted in an enormous increase in the number of infections by *S. haematobium*. Canals are now to be cleaned yearly outflows to drains are to be made and dead ends abolished. BUCHANAN

(p. 594) shows that mechanical pumping of water into irrigation canals in Egypt tends to ensure a continuous supply of snails into them and results in the over watering of the canals and the creation of a sluggish current. On the other hand, the older methods of waterwheels or counter balanced buckets, which are operated by man or animals, allow the canals to dry between waterings. The seasonal variation in venereal disease is apparently related to the falling of the Nile which leaves pools and stagnant creeks or to lowered resistance due to overwork, malaria or underfeeding. He (p. 595) holds that the first essential in prevention is the provision of wells, and the second is to find a suitable type of latrine. The key to the problem is sanitation rather than medication. In the Sudan (p. 286) the chief measures of control consist of the protection of canals against fouling, the provision of good deep wells and the treatment of cases. Villages should be placed not less than 300 metres from canals. Canals should be fenced. Latrines should be provided. The cooperation of the natives however still lags behind the efforts of the Government and the influx of labourers from outside is a danger since it is difficult to examine and treat these people efficiently.

KHALIL and AXIM (p. 667) describe how the use of copper sulphate in a concentration of 5 parts per million acting for 5 days in streams and canals of an oasis, combined with a campaign of tartar emetic injections, eliminated new infections and caused *Bilharzia* to disappear though *Melania tuberculata* and *Limnaea truncatula* persisted. The area under cultivation, which can be taken as a measure of the working capacity of the inhabitants, increased by 25 per cent. as a result. In discussing water supplies WITENBERG and YORK (p. 600) show that chlorine is the only agent which can be depended upon in practice to kill the cercariae of schistosomes and chloramine is its most effective form. Alum precipitation does not affect them and sand filtration will not hold them back. Ten minutes after chlorination the concentration of chlorine should be —For gaseous chlorine 0.6 per million for sodium hypochlorite 0.42 for chloramine 0.22. The water should not be used for 30 minutes after chlorination.

MAKAR (p. 267) found coupled schistosomes in the wall of a gall bladder removed at operation in Egypt. This is believed to be the first time that biliary cholecystitis has been reported during life. Ova of *S. haematobium* were found in the urine and of *S. mansoni* in stool. STEIN (p. 598) found schistosome eggs, believed to be terminal spined in the gall bladder and liver of a Bantu native in South Africa.

SCOTT (p. 596) considers the regularity of the output of eggs by *S. mansoni* to be constant enough to justify the use of the dilution egg count method as in studies of *A. duodenale*. The egg output is less variable when expressed as eggs per cc. of stool than as eggs per unit of time usually *per diem*. Stoll's method was used. The figures quoted in the original abstract however indicate considerable variations between maximum and minimum findings in the same patient and in the relative frequency of eggs of *A. duodenale* and *S. mansoni*.

DOWDESWELL (p. 595) considers that *Planorbis stanleyi* Smith is the intermediate host of *S. mansoni* in Central Kavirondo, Kenya.

VAN DEN BERGHE (p. 219) shows that *S. mansoni* may not be limited to the network of the inferior mesenteric vein. Solitary females may be found alone in the veins near the bowel, but in the liver solitary males are more common. Paired worms are found in the large mesenteric arches, and the worms may inhabit any part

of the portal system POYS (p 597) believes that there are two types of infection with *S. mansoni* hepatosplenic and intestinal with an initial stage common to both This consists of a febrile reaction with abdominal symptoms cough and eosinophilia The second stage is chronic and the pathological reaction is fibrosis In the intestinal type there are dysenteric episodes with enlargement of the liver and spleen In the third stage that of cirrhosis the hepatosplenic form cannot be distinguished from Banti's disease and the intestinal form tends towards obstruction of the bowel PERDOMO HURTADO (p 598) reports the case of a boy with cysts of *E. histolytica* and eggs of *S. mansoni* in the stool and enlargement of the liver Emetine and iatren were not effective in four days but under foudadin the condition quickly improved.

KOPRISCH (p 268) describes *S. mansoni* infection in the rabbit and rat. The changes are not the same as those in man but this may be due in part to the fact that the animals were given a single infection whereas man is usually subjected to repeated infections

MULLER and TESCH (p 218) report the first autochthonous case of infection with *S. japonicum* in the Celebes. WU (p 597) finds that in China cattle are significant in the spread of *S. japonicum*. For oxen an average of 12.6 per cent and for buffaloes 18.7 per cent. were found infected by liver examination.

TERANGUI and MASILUGAN (p 594) found that the sera of various vertebrates (except cat and rabbit) possessed marked cercaricidal properties against the cercariae of *S. japonicum* the titres of warm-blooded known hosts were low those of susceptible cold blooded vertebrates high The titre of the serum of infected guineapigs was much higher than that of normal guineapigs.

CHU (p 268) states that *S. japonicum* is the cause of about 20 per cent of cases of cirrhosis of the liver in Nanking Moderate anaemia is common and high eosinophilia and leucocytosis are important in diagnosis Tartar emetic is the most useful drug foudadin is only effective in very large doses and neostibosan is useless.

Other Trematodes—HUECK and WEN HUAN HUI (p 601) report that of 24 persons infected with *C. sinensis* and treated with foudadin 10 became negative for ova. SHIMIZU and KAWADA (p 269) report that in Japan measures for the prevention of infection by *C. sinensis* include the keeping of ducks infected with *Notocotylus attenuatus* These infect snails (*B. striatulus japonicus*) and render them sterile In two villages the numbers of snails have markedly decreased as the result of the application of this measure during several years. Again, paradise fish destroy the snails and are bred for that purpose and further measures include health propaganda by lectures and cinematograph displays.

LA RUE and AMEEL (p 220) show that the normal definitive host of *Paragonimus* in North America the mink has disappeared from many parts of its former range as the result of trapping The crayfish is present over a large part of the same range however but the snail *Pomatiopsis lapidaria* is still unknown from a large part of the area occupied by mink and crayfish and it is the snail which is evidently the most important factor in limiting the distribution of *Paragonimus*.

MORI (p 220) traces the course of *P. westermani* in experimental animals used as definitive hosts and believes that larvae pierce the small intestine penetrate the diaphragm (through the liver if necessary) to the lungs pulmonary vessels or bronchi. Some may reach the

lungs by the blood stream. WANG and HSIEN (p. 602) find that the X-ray appearances of paragonimiasis are multiple, fairly well circumscribed, usually isolated patches of infiltration in various parts of the lung field. They provide presumptive evidence only but when found in cases in which there is an atypical history of tuberculosis with sputum negative for tubercle bacilli, paragonimiasis should be suspected even if no ova are found.

AFRICA *et al* (p. 601) report the finding of *Heterophyes heterophyes* and *Monorchotremas taihokis* in scrapings of the intestine from a dead Filipino. Eggs were found in the myocardium and spinal cord. The authors also report heterophyid eggs in the heart muscle in another case, and a cellular response typical of that condition but without eggs in a third. Adults were found in the intestine and eggs in the calcified mitral valves of both of the latter. ALICATA and SCHATTENBURG (p. 601) in Hawaii describe a case of infection with a heterophyid *Stellantchasmus falcatus* the fresh water mullet *Mugil cephalus* is probably an intermediate host.

KUANG WU (p. 221) reports that metacercariae of *Fasciolopsis buski* have been found on two new plants, *Salvinia natans* and *Spirodela (Lemna) polyrrhiza* which are common in the endemic area of Chekiang. WU (p. 299) found that *F. buski* developed to maturity in pigs and rabbits and that immature worms were present in dogs and a young buffalo after feeding with cysts. Other animals tested were apparently resistant. Only one of over 200 children affected with *F. buski* examined by MCCOY and CHU (p. 221) was found to be suffering from the classical symptoms of diarrhoea, distended abdomen, oedema of the face and stunted development. hexylresorcinol treatment (doses 0.4 to 1 gm.) resulted in the disappearance of eggs in 54 per cent. Calculations of the estimate made of the numbers of worms based on egg counts, are criticized by LAKE.

BRUG and TESCH (p. 218) found ova indistinguishable from those of *Echinostoma ilocanum* in 47 per cent. of 68 samples of faeces in the Celebes. SKRJABIN (p. 789) reports infection of a patient with *Echinostoma parvulum* the first to be reported in man.

Cestodes

Experimenting on himself TARASSOV (p. 270) found that after swallowing 7 plerocercoids of *D. latum* 7 heads were subsequently expelled. Fifteen months later he swallowed 8 plerocercoids later expelling two heads. After an interval of one year he swallowed 7 and a year later 6 all without infection, but from 6 more swallowed after another year 4 heads were expelled. After these various expulsions the passage of onchospheres and segments ceased in all instances. He therefore considers that infection with *D. latum* gives rise to immunity lasting 2 or 3 years but not longer and findings in the inhabitants of a village support this opinion.

In the *Journal of the American Medical Association* (p. 759) it is stated that the process of kippering does not kill the plerocercoid larvae of *D. latum* but saturation with brine is fatal after a month if penetration is thorough. Ordinary smoking is ineffectual but hot smoking for one hour or more at 75°C is fatal.

MUELLER (p. 667) gives the features which differentiate *Diphylobothrium mansonioides* from *D. mansoni*; these cannot be abstracted. He points out that in the widespread areas in the United States where this worm affects native wild-life man must be constantly exposed to

infection through drinking water from natural sources. Infected Cyclops are widely scattered.

HELLER (pp 223-602) treats ocular sparganosis with intravenous novarsenobenzol with excellent results. The dose is 30 cgm. for adults and two to six doses are given at 4 or 5 day intervals. This should not be exceeded.

In the southern U.S.A. SUNKES and SELLERS (p 225) report that of 7,249 tapeworm findings in man 93.6 per cent. were *H. nana*. *T. saginata* occurred 58 times *H. diminuta* 82 *T. solium* 8 *D. latum* once and *D. carinatum* once.

DAMON (p 602) gives details of a method of staining with picric acid and preparing tapeworm proglottids for preservation in such a way as to make clear the outline of the uterus.

PENFOLD *et al* (p 604) have succeeded in hatching the ova of *T. saginata* by artificial gastric digestion followed by artificial pancreatic digestion.

PENFOLD *et al* (p 224) found that some oncospheres of *T. saginata* were viable if kept in normal saline at 2 C. to 5°C. for 13½ weeks or in the saline for 9 weeks and then exposed on pastures for 8 weeks in mild conditions or kept on dry pastures for 14½ weeks or dry for 2 days under laboratory conditions. If dried in normal saline i.e. in salt solution becoming progressively stronger however none was alive after one day.

SANDGROUND (p 676) treated 16 patients with tapeworm with carbon tetrachloride in a dose of 4 cc. The parasites were eliminated in 12. 3 were not followed up properly and 1 vomited the drug. Hexylresorcinol and tetrachlorethylene may have greater taeniacidal value than the results of a small reported investigation indicate. LANE however (who has stated that 1.55 cc. of carbon tetrachloride may be fatal) points out that the dosage used by Sandground is even greater than that which proved fatal to two patients with *Trichurus* infection reported on p. 675 and that to evaluate an anthelmintic, a large series of patients should be followed up.

MAPLESTONE and MUKERJI (p 283) found three recurrences in 13 patients treated for *Taenia* infection with tetrachlorethylene.

KRAYER (p. 604) recommends pumpkin seeds for the expulsion of tapeworms and gives details of the preparations.

MAPLESTONE and BHADURI (p 224) comment on the rarity of cysticercosis in Indians in comparison with British troops. Pigs are frequently infected. They suggest that Indians may have an enhanced resistance to infection by the oncosphere and that the strobiles may on occasion be digested so freeing the eggs in cases of cysticercosis without strobiles as is the case for *D. latum*. LANE suggests that air convection is a factor.

RAO (p 225) considers that cysticercosis of the brain (although X-ray was negative) might have been the cause of jerking movements of one arm in a patient in India. A cysticercus was found in the other arm.

CASTELLANI (p 225) describes a condition in which small nodules of fibrous tissue with no sign of cysticercus occurred in 3 patients with positive Wassermann reactions. They had been diagnosed as cysticercosis but cleared up under antisyphilitic treatment.

NARIHARA (p 270) reports *H. diminuta* infection of a child in Taihoku city.

BACIGALUPO (p. 668) names *Embla argentina* as a new intermediate host of *H. diminuta*. SCOTT (p. 668) gives a list of other insects in which cercocysts have been seen.

ZIMMERMAN (p. 605) suggests that the dog flea *Ctenocephalus canis* is probably the intermediate host of *Dipylidium caninum* and the dog louse *Trichodectes canis* that of *D. sexcostatum*.

SAMI (p. 603) reports 28 cases of hydatid cyst in the Punjab and details the habitats. In 153 local dogs, 45 showed *Echinococcus granulosus* and the infection rate in herbivores was 1 per cent. in sheep and goats and 150 of 168 cattle.

DUNGAL (p. 603) reports a hydatid cyst in the left ventricle of the heart with perforation into the pericardium. Death was due to carcinoma of the stomach. It is suggested that hexacanth embryos may reach the coronary arteries via the patent foramen ovale where this exists in hydatid infestation of the heart.

YMAZ APPIATTE (p. 223) describes techniques for separating toalbumin and anatoxin from hydatid fluid. The albuminoid fraction gives stronger intradermal reactions and possesses higher specific antigenic potency than the saccharide fraction or the pure fluid.

DE WAELE and DE COOMAN (p. 604) report on the experimental infection of various animals with hydatid in Belgian Flanders. It is found mainly in the horse.

C. H. Wilcocks

(To be continued)

HELMINTHIASIS

PRECIS OF ABSTRACTS IN THIS SECTION

NASTASI (p. 618) has investigated the incidence of schistosomiasis and the larval hosts in Libya. ZAVATTARI (p. 618) reports that schistosomiasis, both vesical and intestinal is more widely spread in Abyssinia than was thought and urges further investigation.

MARTINS and Dos ANJOS (p. 618) report an infection rate of 85.18 per cent with *S. mansoni* in a little town in Minas Geraes, and of 28.73 in the whole area. CAWSTON (p. 619) contends that the shape of schistosome eggs is of value in promoting adhesion to mucus or faeces so preventing drying before they reach water. HOFFMAN (p. 619) failed to infect *Plasmodium corvini* with the miracidia of *S. mansoni*.

EL GAZAYERLI (p. 619) reports finding a healthy male schistosome in a branch of the left coronary artery. HASSAN (p. 619) investigated the spectroscopic changes in the serum in schistosomiasis. CAWSTON (p. 620) points out the importance of examining whole urine of not using a cystoscope in untreated persons, and of using filtered and sterilized solutions of tartar emetic in schistosomiasis.

MAINZER (p. 620) shows that there is a great discrepancy between the clinical findings and the X-ray appearances of the lungs in schistosomiasis. The latter consist of distinct foci, increased striation and intensified hilar shadows. There may be symptoms suggesting tuberculosis, pulmonary fibrosis or asthma. He (p. 620) regards an increase in blood eosinophilia under antimony treatment in a doubtful

case as favouring the diagnosis of schistosomiasis. KENAWA (p 620) reports two cases in which venous hum in bilharzial cirrhosis of the liver was associated with a probable connexion between the portal and systemic systems.

ASHKAR (p 621) treated 24 patients with anthiomaline with considerable success. He gives details of dosage and of the various effects produced by the drug. IMPALLOMONTI (p 621) reports favourably on intravenous stibional B in the treatment of schistosomiasis. DIAMANTIS (p 622) urges mixed antimony and emetine treatment in comparatively small doses. KUNERT (p 622) used provocative injections of germanin after courses of sodium antimony tartrate to stimulate the passing of eggs and so test the value of the original treatment. DAVID (p 622) failed to free the urine from schistosome eggs by the use of dicuprene and cuproquine.

MINAJILA (p 623) advises the use of 1 per cent quicklime in the water of ditches and of a steam jet in mud for the destruction of *Oncomelania nosophora* the host of *S. japonicum*. MARTINS and VERSIANI (p 623) in view of the increase in *S. mansoni* infection in Belo Horizonte advise the examination of all inhabitants the treatment of the infected the construction of latrines and the provision of a sanitary service.

KOBAYASHI and YUMOTO (p 624) describe abnormalities in *C. sinensis*. NIETO ROARO and CABALLERO (p 624) discuss the possibility of the adaptation of imported *C. sinensis* to alternative hosts in Mexico where Bithynia are not found. MUTO (p 624) records a new fresh water fish intermediate host of *C. sinensis*.

KINUGASA (p 624) reports favourably on the use of founadim in *C. sinensis* infections. CHU (p 625) found that *in vitro* and in a concentration of 1 in 40 000 which approximates to a possible concentration in the blood, gentian violet malachite green and Nile blue killed *Clonorchis sinensis* within 24 hours. Gentian violet was the most effective and this result supports previous work in experimentally infected animals.

ERHARDT (p 625) investigated the effect of osmotic pressure and changes in pH on *Opisthorchis*. AFRICA (p 625) mentions various *Haplorchis* flukes from the Philippines.

AZIM (p 626) shows that heterophyids are found in 59 to 75 per cent of dogs and 90 per cent. of cats in Egypt.

BACIGALUPO (p 626) shows that *Limnaca vatrix* is an effective host of *F. hepatica* in Cuba. BÜRG (p 626) records a child with infection by *F. hepatica*. MANCAUX and ALCAY (p 626) show that infection with *F. hepatica* simulated appendicitis in one patient. osinophilia of 21 per cent led to examination for eggs. KOURI (p 626) use emetine with success in the treatment of *F. hepatica* infections. *C. sinensis* infections are common among Chinese in Cuba.

BUCKLEY (p 627) reports that *F. buskii* and *Gastrodiscoides hominis* are common in man in Assam. *Segmentina trochoideus* is an intermediate host of *F. buskii*.

KINUGASA (p 627) details the symptoms found in a series of children infected with *Paragonimus*.

AN DEN BERGHE *et al* (p 628) report that *Dicrocoelium dendriticum* have been found in two Europeans in the Congo and in monkeys not in the natives who cook vegetables well, before eating

VASTASI (Antonino) Schistosomiasis e malacofauna nel Sahara Libico (Fezzan e Gat) [Schistosomiasis and Snails in the Libyan Sahara (Fezzan and Gat)]—*Polidimico Sez. Prat.* 1938. Oct. 17 & 24 Vol. 45 Nos. 42 & 43 pp 1907-8 1911-15 1951-2, 1955-6 1959-61 With 1 map [16 refs.]

An investigation further determining the local incidence of schistosomiasis and the snail hosts in detail in Fezzan and Gat.

The map makes clear the places where infection with *S. haematobium* has been detected and where *Bulinus contortus* has been found. *Planorbis pfeifferi* was present at Gat in the extreme southwest of the area in question but infection with *S. mansoni* seems absent. Very probably the nature of land or water it is felt, is mimical to *Planorbis*. [See also this *Bulletin* 1934 Vol. 31 p 773.]

Clayton Lane

ZAVATTARI (Eduardo) I problemi sanitari dell'Impero schistosomiasis e malacofauna nell'Africa Orientale Italiana. [Sanitary Problems of the Empire Schistosomiasis and Snails in Italian East Africa.]—*Ann d'Igiene* 1938. Sept.-Oct. Vol. 48. No. 9-10 pp 573-582. [23 refs.]

After a consideration which is confessed as necessarily incomplete, there is urged the need for determining the local distribution of the schistosomes of their manifestation as urinary or intestinal parasites, and of their respective snail intermediaries. Before the recent war the only place in which there was certainly endemic vesical schistosomiasis was the lower valley of the Shabeli there were a few doubtful cases reported elsewhere but intestinal schistosomiasis had never been diagnosed. During the war it became clear that vesical infection was wider pread and that the intestinal form was important but the environmental conditions determining its presence were unknown and these have to be ascertained in the interest of all inhabitants.

C L

MARTINS (A. Vianna) & Dos Anjos (W. Versiani) Schistosomose mansoni no norte de Minas Geraes [Mansonian Schistosomiasis in the Northern Part of the State of Minas Geraes, Brazil. —*Brasil Medico* 1938 Sept 3 Vol 52 No 36 pp. 812-816 English summary]

The area surveyed included eight municipalities. In all of them the disease was found in percentages varying from 3.22 to 85.18. This last one, which the authors believe to be the highest ever recorded in the medical literature was found in the little town of Fortaleza (Minas Geraes). The incidence of the disease in the area surveyed, considered as a whole, was of 28.73 per cent. The authors believe that the disease was recently imported from the north-eastern region of Brazil.

The technique used was concentration by sedimentation following HOFFMAN, PONS and JAYER using two grams of faeces which method is held to be optimum for the disclosure of schistosome eggs but inferior to that of Wilts for others. In the 348 faeces examined by it the percentages of infection disclosed were—*A. lumbricoides* 41.12, *S. mansoni* 28.73, *A. americanus* 18.01, *S. stercoralis* 13.70, *T. trichiura* 6.72, *H. nana* 1.07, *E. vermicularis* 0.28 and *Taenia* sp. 1.34.

C L

CAWSTON (F Gordon) Variation in the Shape of Schistosome Ova.—
Trans Roy Soc Trop Med & Hyg 1939 Jan 28. Vol. 32.
 No 4 pp 553-554

An explanation, on the ground of advantage to the species of the various shapes of schistosome ova.

The elongated flattened eggs of the schistosomes of cattle will by their shape adhere readily to mucous discharge if they have come from the nose or to faeces if they have come from the bowel, and this adhesion will lessen the risks of their drying before they reach water and the lateral spine of the egg of *S. mansoni* will similarly anchor it to faeces. The miracidium of *S. japonicum* gets into an operculated mollusc inhabiting rice fields and capable of surviving long periods of drying so the egg has no need of a spine or special shape [The reasoning seems to refer to eggs of the last passed directly into water overlying a ricefield.]

C L

HOFFMAN (W A) *Planorbis corneus* not an Intermediate Host of *Schistosoma mansoni*.—*Puerto Rico Jl Public Health & Trop Med* 1938 Sept. Vol. 14 No 1 pp 24-25 [Spanish version pp 26-27]

Planorbis corneus has been introduced through New Jersey into Porto Rico for use by fish fanciers in their aquaria in place of *P. glabratus* which carries schistosomiasis. All attempts during the last year to infect *P. corneus* with the miracidium of *S. mansoni* have failed. This is evidenced by the fact that continuous watching under the microscope of tentacles and head of a snail attacked by many miracidia has failed to show penetration in any instance that none of the snails passed cercariae and that dissection of the liver showed no sporocysts. Yet this snail carries avian trematodes in the Old World and some of these might find it a suitable host in Porto Rico

C L

EL GAZAYERLI (Moumr) Unusual Site of a Schistosome Worm in the Circumflex Branch of the Left Coronary Artery.—*Jl Egyptian Med Assoc* 1939 Jan. Vol. 22. No 1 pp 34-37 With 1 fig

The worm was discovered because that part of the heart in which it lay happened to be chosen for sectioning. It was a healthy male free in the lumen and the wall of the artery where it lay was healthy. The foramen ovale was closed. The man aged 24 died of suppurative meningitis of brain and spinal cord, and had had no cardiac symptoms. There were bilharzial lesions in lungs, rectum, appendix and the urinary organs and scrapings from rectum bladder and seminal vesicles revealed only eggs of *S. haematobium*

C L

HASSAN (A) The Ultra-Violet Absorption Spectra of Sera in Human Schistosomiasis.—*Jl Trop Med & Hyg* 1939 Jan 16. Vol. 42. No 2. pp 17-18. [13 refs]

It seems, therefore from our spectrophotographic investigation that the fundamental difference between schistosomiasis sera and normal ones lies in the former usually exhibiting a greater intensity. We suggest that this deviation in the absorption spectra is probably due to some changes in the relative amounts of the constituents of the serum proteins

C L

CANSTON (F Gordon) The Importance of Pathology and Dispensing in Schistosomiasis.—*Jl Trop Med & Hyg* 1939 Apr 1 Vol 42 No 7 pp 88-89

Three practical points are brought out. Urine sent for macroscopic examination must be whole urine as Canston has seen a nursing sister carefully decant the supernatant urine which had stood overnight into a bottle too small to take all the specimen so that the pathologist did not get the essential part. A cystoscope should not be passed in untreated persons, for there are few bacterially infected cases which may not be traced to such a passage. A filtered and then sterilized solution of tablets containing tartar emetic and sodium chloride is far less likely to produce coughing on intravenous injection than is an unfiltered one. C L.

MAIXNER (Fritz) Clinical Aspects of Pulmonary Diseases Induced by *Schistosoma haematobium* and *mansoni*.—*Jl Egyptian Med Assoc.* 1938 Dec. Vol. 21 No 12, pp 782-795. With 3 figs. [19 refs.]

"In this condition as in no other pulmonary disease there is mostly a striking discrepancy between the smallness of the clinical findings (obtained by percussion as well as auscultation) and the intense changes of the lungs shown by X-rays

The X-ray types of pulmonary tuberculosis whether with *S. haematobium* or *S. mansoni* are these distinct foci varying in size density and distribution increased vasculation enlarged and intensified hilar shadows. There may be cough, fever and wasting simulating tuberculosis and, after treatment has killed all parasites, contracting fibrosis may narrow bronchioles and pulmonary arteries with the respective sequelae. On the other hand there may be an allergic bronchial asthma having no such relationship as the other effects have with the habitat of the worms. [See also this *Bulletin* 1938 Vol 35 p 685] C L.

MAIXNER (F) Reactional Increase of the Eosinophil Proportion of the Blood in Schistosomiasis subsequent to Antimony Treatment a Phenomenon in Support of the Recognition of Latent Infection.—*Jl Trop Med & Hyg* 1939 Mar 15 Vol 42 No. 6 pp 88-89

In infections both with *Schistosoma haematobium* and *S. mansoni* there is apt to occur an increase in the blood eosinophilia under treatment with antimony. In doubtful cases a rise of this sort under antimony treatment favours a diagnosis of schistosome infection, though a failure of such a rise to take place does not exclude the infection. C L.

KENAWY (M. R.) Venous Hum in Bithariol Cirrhosis of the Liver.—*Lancet* 1939 Apr 8 pp 821-822. With 1 fig.

Continuing on the subject indicated in the title [see this *Bulletin* 1937 Vol 34 p 884] Kenawy reports two cases in which this hum,

usually strictly localized was associated with a slight epigastric swelling which on light pressure of the finger yielded a thrill and of the stethoscope a murmur—both disappearing on heavier pressure. Its presence is believed to point to a connexion between systemic and portal systems.

C L

ASHKAR (M. F.) Treatment of Schistosomiasis with Anthiomaline (a Preliminary Report).—*Jl Egyptian Med Assoc* 1938. Sept. Vol. 21. No 9. pp 614-619

Report on 24 patients with urinary schistosomiasis treated intramuscularly with antimony thiomalate of lithium in a 6 per cent solution.

Injections into dogs showed anthiomaline to be more toxic than founadin as 3 to 2. Injections into 2 men in doses increasing from 1.25 to 4.5 cc. showed dead ova after giving 3.25 and 24.75 cc. respectively. Injections of 1 cc. gave rise to thirst headache joint pains and a feeling that the teeth were loose but pulse temperature and blood pressure were unchanged. Seven patients had twelve injections given every other day of 1.5 and 3 cc. and then ten of 4.25 cc. living ova ceased to be passed after giving 21.5 to 55.5 cc. in one patient dysenteric symptoms came on but were disregarded and disappeared in another abdominal pain and vomiting were present after the ninth and tenth injections but on the dose being reduced to 4 cc. they disappeared. The pain of the injections was very slight and the only other change noted was an increase in eosinophilia. All these treatments were on in patients. Next 10 out patients were treated, one ceased to attend, the rest had every other day maximum doses of 1 cc. for every 15 kilos of body weight this maximum as before being reached at the third injection. In 8 of them the ova disappeared or died after from 8 to 9 injections in the remaining patient they were still living after the ninth injection. 4 of the 9 had vomiting pain or headache. In the last series there were 5 daily doses and then others every other day (the dose being unstated) till the results were negative as they were after between 8 and 11 injections no symptoms being noted throughout.

C L

IMPALLOMINI (Rosario) Di un nuovo preparato di antimonio nella cura delle schistosomiasi umane [A New Antimony Preparation in the Treatment of Schistosomiasis of Man].—*Arch Ital Sci Med Colon e Parassit* 1933. June. Vol. 19. No 8. pp. 370-376

Stibional B a pentavalent antimony preparation has been given with satisfaction to 20 persons with urinary schistosomiasis and to one with intestinal infection.

The drug is given intravenously in doses of 2-4.5 and 10 cc. for the first three days treatment is omitted on day four and continued in 10 cc. doses on days 5-6 and 7 and beyond this if need be. It is apt to produce fever which ceases on suspending treatment. Haematuria rapidly disappeared, the miracidium died and subjective symptoms improved.

C L

DIAMANTIS (A.) La mort subite en stibiothérapie antibilharzienne et les déductions chimiothérapeutiques qui en découlent à propos du "Fouadin Tolerance Test" du Prof. Khalil Bey [Sudden Death in the Treatment of Schistosomiasis by Antimony and Chemiotherapeutic Deductions arising therefrom as to Khalil's Fouadin Tolerance Test.]—*Rev Prat Malad. des Pays Chauds* 1938. Nov 30. 17th Year Vol 18. No. 13 pp 599-604 607-8 611-12.

Diamantis once again [see this *Bulletin* 1938 Vol. 35 p. 599] stresses the sudden and unforeseen character of the many antimony deaths in Egypt, the practical inadequacy of Khalil's fouadin tolerance test, and the necessity of giving a mixed antimony and emetine treatment in quantities which are below the lethal dose of each. C L.

KUMERT (H.) Ein Nachweis zur Dauerheilung der Bilharziois haematobia durch Infektion von Germanin (Bayer 205) [The Duration of Cure of Infection by *S. haematobium* Indicated by Injection with Germanin.]—*Zent f. Bakt I Abt. Orig.* 1939 Feb 20 Vol 143 No 3/4 pp 161-164

Writing from what is described as being at, or for the time (sur Zeit) Tanganyika Territory Kumert treated 45 persons from 12 to 15 years of age with intravenous injections of sodium antimony tartrate each of 0.12 gram for the young and 1.44 gm. for adults. He aimed at giving 12 of such injections, three a week, but did not succeed in doing so in six of the younger patients, but when a month later 33 of these patients were re-examined, the urinary deposit showed dead eggs only. He then gave provocative injections of Germanin 2 and 8 months later after the first, living eggs were passed by the six in whom 12 injections had not been given (the numbers given had been 5 8 8 8 8 and 7) and by no others after the second provocative injections no living eggs were passed, but they included none of the six who had had short treatments. C L.

DAVID (J.) Note sur l'emploi des sels de cuivre Dicuprène et Cuprochine dans la schistosomiase urinaire [Salts of Copper Dicuprine and Cuproquine, in Urinary Schistosomiasis.]—*Ann Soc Belge de Méd Trop* 1938. Sept. 30 Vol 18. No 3 pp 377-380

Neither salt freed the urine of schistosome eggs.

Dicuprene (cupro oxyquinoline disulphonate of diethylamine) was given intravenously without incident in doses of 5 cc daily with total dosage of 25 cc to 65 cc Cuproquine (sodium cupro oxyquinoline sulphonate) was given by mouth to children by nuns, according to weight but without progressive increase in the doses in totals of 6 to 15 grams but of the actual doses it is merely said that they were 0.2 gram greater than those given by VAN NITSEN [this *Bulletin* 1937 Vol 34 p 800] the children's general condition was improved. The contrast with van Nitsen's results in intestinal infection is emphasised. C L.

MRYAJIMA (Mikinosuke) On the Prevention of Schistosomiasis in Japan.—*Jl Public Health Assoc Japan* 1938 Nov Vol. 14 No 11 pp 1-6.

The measures advised for prevention of schistosomiasis are those which have stood the test of local experience. More than three-quarters of the registered deaths which take place in Japan from this infection are reported from the Yamanashi Prefecture. Up to 1925 there were in the country about 100 deaths a year from 1930 to 1934 they have averaged rather less than 70. The intermediate host *Blanfordia oncomelania nosophora* being a snail which lives partly in water and partly in soil the attack on it is twofold. In water quicklime which is cheap works well. At a strength of 2 per cent. it destroys the snail in 10 hours at 1 per cent. it is uncertain but apparently it is held to be effective in 24 hours for the advice is that a ditch in which the snails are present should be dammed up for that time and quicklime put in to bring its strength up to 1 per cent. For the snails in mud the edges of paths and the weeds parts of emptied ditches should have a steam jet thrown on them. After these methods were used the percentage of schistosome egg carriers which had before been 19.8 fell by two years to 7.9 by four years to 5.6 and by 6 years to 4.4. But *B. nosophora* began to appear again after four years and it is advised that the campaign against them should be repeated every ten years [which seems inadequate if the snails reappear in four years].

C L.

MARTINS (Amílcar Viana) & VERSIANI (Waldemar) Plano de combate á Schistosomose mansoni em Belo-Horizonte. [A Plan for fighting Schistosomiasis in Belo Horizonte].—*Hospital Rio de Janeiro* 1939 Mar Vol. 15 No 3 pp 563-570.

With an increase in the number of cases examined for Mansonian schistosomiasis from 151 in 1931 to 2,650 in 1938 there has gone an increase in detected infection from a percentage of 0 to one of 11.69. The advised procedure is the examination of the faeces of all inhabitants by some concentrative method suitable to the eggs of the parasite the treatment and re-treatment as required, of all infected, the construction of latrines and a sanitary service.

C L.

OSAKA (Kiyosi) Studies on the Biological Behaviour of the Cercariae of *Schistosoma japonicum*. Part I. Observations on the Escape of Cercariae from their Snail Hosts.—*Taiwan Igakkai Zasshi (Jl Med Assoc Formosa)* 1938 Dec Vol. 37 No 12 (405) [In Japanese pp 1952-1962. With 2 figs. [10 refs.] English summary pp 1963-1964].

GIOVANNOLA (Arnaldo) Osservazioni sui gasteropodi della Sardegna d'importanza medica e veterinaria. [Medical and Veterinary Importance of the Gasteropods of Sardinia].—*Rendiconti Istituto di Sanità Pubblica* Rome. 1938 Vol. 1 Pt. 2 pp 506-517 With 11 figs. [11 refs.]

KOBAYASHI (H.) & YUMOTO (Y) Some Studies on Abnormal Liver Flukes, *Clonorchis sinensis*.—*Taiwan Igakkaï Zasshi (Jl Med Assoc Formosa)* 1938. Sept. Vol 37 No. 9 (402) [In Japanese pp 1474-1479 With 9 figs. on 1 plate. English summary pp. 1479-1481]

The abnormalities consist of bulges and rents in the uterus with extrauterine eggs in the receptaculum seminis, excretory duct and bladder in the parenchyma, in the oral sucker and in Laurer's canal, and a few elsewhere C L

NIETO ROARO (Daniel) & CABALLERO (Eduardo) Nota acerca de la presencia de *Clonorchis sinensis* en Mexico [The Presence of *Clonorchis sinensis* in Mexico].—*An Inst Biol Mexico* 1938. Mar & June Vol 9 Nos 1 & 2 pp 165-166. With 2 figs.

Certain persons returning to Mexico after living in China were found in 1937 to be passing ova of *Clonorchis sinensis*. The fact was reported to the Public Health authorities in fear of this parasite becoming disseminated. The same applied to *Paragonimus*. Though *Carassius auratus* (the second intermediate host of *Clonorchis*) is found in Mexico the molluscan host *Bithynia*, is not nor are the crab-hosts of *Paragonimus*, so the danger is not pressing. Since however *Onchocerca volvulus* (says the author) became adapted to Mexican hosts, either introduction of the Chinese molluscs into Mexico or adaptation of the developmental stages of the *Clonorchis* to other alternative hosts might in time lead to spread of infestation by this trematode.

H H S

MUTO (S) A New Species of Fresh-Water Fishes which serves as a Second Intermediate Host of Liver Fluke, *Clonorchis sinensis* in Formosa.—*Taiwan Igakkaï Zasshi (Jl Med Assoc Formosa)* 1938. Oct Vol 37 No 10 (403) [In Japanese pp 1537-1539 With 1 fig [12 refs.] English summary p. 1539]

In the body of the paper and in the English summary this new second intermediate host is variously designated as Family Cyprinidae, Genus *Culterculus* [*Cultricalus*] (Oshima) or (Oschima) Species *Ameri* or *kueri* n sp. and in the Japanese title which clearly differs from that of the English abstract these names appear—*Culterculus Ameri* (Kregerberg). [Moreover it is difficult to regard the generic name as conforming to the Latin form prescribed in the International Code of Zoological Nomenclature but for that Muto seems in no way responsible] C L

KINUGASA (M) On the Treatment of *Clonorchis sinensis* with Fuadin.—*Taiwan Igakkaï Zasshi (Jl Med Assoc Formosa)* 1939 Feb Vol 38 No 2. [In Japanese pp 290-294 [15 refs.] English summary p 294]

It appears from the English summary that patients ceased to pass *Clonorchis* eggs after two courses of Fuadin in unstated dosage. Fuadin is therefore superior to the preparations of antimony that have hitherto been used, but it is regrettable that toxic symptoms often appear towards the latter half of the injection period. C L

- CHU (H J) Studies on *Clonorchis sinensis* in vitro. Part II. Action of Various Dyes.—*Chinese Med J* 1938 Nov Vol. 54 No 5 pp 409-415 [10 refs]

All *Clonorchis sinensis* specimens used for the experiments were adults obtained from experimentally infected rabbits and cats. The containers were Carrel flasks of the 35 type the medium consisted of inactivated horse serum diluted with an equal amount of Ringer solution. The substance to be tested was added to the medium in different amounts so that each substance was examined in concentrations ranging from 1/2 500 to 1/400 000. A concentration of 1/40 000 was regarded as of special importance since it approaches most closely a concentration which might be used for treatment in vivo.

Sixteen dyes belonging to four groups, Aniline Phthaline Acridine and Sulphonamide have been tested in vitro with regard to their clonorchicidal action. The medium consisted of horse serum diluted with an equal amount of Ringer solution to which the dyes were added in various concentrations. It was found that at a concentration of 1/40 000 which corresponds most closely to an eventual therapeutical concentration, Gentian violet, Malachite green and Nile blue sulphate killed *Clonorchis sinensis* within 24 hours. Of these three dyes Gentian violet was the most effective. This result of in vitro experiments supports previous work on the effect of Gentian violet on *Clonorchis sinensis* in experimentally infected animals.

- ERHARDT (Albert) Der Einfluss der Wasserstoffionenkonzentration unter aeroben und anaeroben Bedingungen des osmotischen Druckes und der Temperatur auf die Lebensdauer von *Opisthorchis* in vitro [The Influence *in vitro* on the Life Span of *Opisthorchis* of pH in Aerobic and Anaerobic Conditions, of Osmotic Pressure and of Temperature]—*Arch f Schiff- u Trop Hyg* 1939 Jan Vol 43 No 1 pp 15-19 With 1 fig

Opisthorchis taken at once from the gall bladder of killed cats was used. In both aerobic and anaerobic conditions the flukes lived longest in pH 5.9 to 6.3 in aerobic conditions there was a second maximum at pH 7.6. Change in osmotic pressure and lowering of temperature affected the flukes little.

C L.

- AFRICA (Candido M) Description of Three Trematodes of the Genus *Haplorchis* (Heterophyidae) with Notes on Two Other Philippine Members of this Genus.—*Philippine J Sci* 1938. July Vol. 68 No 3 pp 299-307 With 2 plates.

The *Haplorchis* flukes here described are—*H. calderoni* (Africa and Garcia 1935) from the small intestine of dog cat and man *H. vanisima* n. sp. from the small intestine of man *H. sisoni* n. sp. from the small intestine of cats and dogs experimentally transferred by CHEN from the genus *Monorchotrema* and *H. yokogawai* similarly transferred by Chen and of which *H. pumilio* becomes a synonym. During the writing of this paper several specimens of *H. laichui* were received from Palestine through the courtesy of Professor WITENBERG of Hebrew University Jerusalem. The locality of collection is unstated.

ARZI (Abdel) Helminthes parasites des chiens et des chats en Egypte. [Helminths of Dogs and Cats in Egypt.]—*Ann. Parasit. Humains et Comparés* 1939 Jan. 1 Vol. 17 No. 1 pp 32-36 [20 refs.]

Of these parasites the forms of most interest to human medicine are the heterophyids. They are found in 73 per cent of dogs in Alexandria and 59 per cent of those in Cairo while 90 per cent of cats are infected. *Dracunculus medinensis* has been found twice in the paws of dogs.

C. L.

BACIGALUPO (Juan) *Fasciola hepatica* Su ciclo evolutivo [The Developmental Cycle of *F. hepatica*]—*Rev. Med. Trop. y Parasit. Habana* 1938 July-Aug. Vol. 4 No. 4 pp 203-206 With 11 figs on 3 plates

The life cycle of *F. hepatica* in *Limnaea stagnalis* is followed through with microphotographs, showing that this is an effective host in Cuba.

C. L.

BURGI (Kuno) Ein Fall von Leberdistomatose bei einem 4-jährigen Kinde (*Fasciola hepatica*) [Infection of the Liver by *F. hepatica* in a Four Year-Old Child.]—*Schweiz. Med. Woch.* 1938 Nov 19 Vol. 68 No. 47 pp 1274-1277 With 1 fig. [18 refs.]

A boy of 4 who had been ill for three months came under observation with a diagnosis of a localized appendicular abscess. Examination showed in the stool eggs of *Ascaris*, *Enterobius* and *F. hepatica* of which last statement a microphotograph leaves no doubt. The swelling in the right lower abdominal quadrant disappeared after emetine injections and a treatment with chemo-san brought away 5 ascarids but their eggs and those of *Fasciola* persisted, and his relations refused a proposed appendicectomy in the quiescent stage nor would they bring him for subsequent examination.

C. L.

MANCERIX (A.) & ALCAY (M.) A propos d'un cas de distomatose hépatique à *Fasciola hepatica* [A Case of Liver Infection by *F. hepatica*]—*Bull. Soc. Path. Exot.* 1939 Feb. 8. Vol. 32. No. 2 pp 169-172

The eggs of *F. hepatica* were discovered in the faeces, and in the duodenal contents removed by a sound, from a woman of 26 who had thereby been saved appendicectomy for appropriately situated attacks of pain. An eosinophilia of 21 per cent. led to the examinations which discovered the eggs. She had been troubled for 3 years the attacks persisting in spite of emetine the eosinophilia rising to 28 per cent. of 27 000 white cells presumably per cubic millimetre.

C. L.

KOURI (Pedro) BARRUEVO (José G.) SOTOLONGO (Federico) & ARIZO (Vicente) Estado actual de la distomatosis hepática en Cuba. Su diagnóstico y tratamiento [Hepatic Distomatosis in Cuba its Present Incidence, its Diagnosis and Treatment.]—*Rev. Med. Trop. y Parasit. Habana* 1938 July-Aug. Vol. 4 No. 4 pp 185-202 [17 refs.]

The two liver flukes interesting medical men in Cuba are *Fasciola hepatica* and *Clonorchis sinensis*. *F. hepatica* has been known in the

local slaughterhouses from time immemorial and in human inhabitants since 1931. The clinical symptoms which have been seen in the infections are noted as are the pathological lesions but a single faecal examination does not suffice to exclude the presence of infection. The specific treatment is emetine and it is believed that it poisons the fluke by its presence in the blood which the fluke swallows after the blood has escaped into the biliary passages. Its failure to cure is suggested due to the flukes being in such cases enclosed in fibrous capsules.

C. sinensis has been found in Chinese in Cuba in a percentage of 49 of those sick and in 23.53 of those killed in accidents. The lesions and treatment are briefly considered. C. L.

BUCKLEY (J. J. C.) Observations on *Gastrodiscoides hominis* and *Fasciolopsis buski* in Assam.—*Jl Helminthology* 1939 Jan. Vol. 17 No 1 pp 1-12. With 1 map & 2 figs.

Fasciolopsis buski and *Gastrodiscoides hominis* are recorded as common human infections in Kamrup District Assam where the examination of 221 faecal specimens from different localities gave an average infection rate of 59.7 per cent with *F. buski* and 41.2 per cent with *G. hominis*. In individual infections *G. hominis* may occur in very large numbers. 989 specimens were obtained on one occasion by means of soap water enemas which are effective in removing these worms. Attempts to find the snail intermediary of *G. hominis* experimentally and by dissecting snails for natural infections were unsuccessful. The egg and miracidium are described. A list of water snails found in the endemic areas is given. As a result of experimental infections *Serminina trochodonta* is recorded as a new intermediate host of *F. buski*. A list of edible water plants which may possibly act as vehicles for the infective stages of the flukes in Kamrup is given.

C. L.

KINUGASA (M.) Investigations on the Incidence of Lung Fluke Disease (*Paragonimus westermani*) in Sinitiku Prefecture I. On its Incidences in Primary School Children in Sinitiku Prefecture.—*Taiwan Igakkai Zasshi (Jl Med Assoc Formosa)* 1939 Feb Vol. 38 No 2. [In Japanese pp 277-288 English summary pp 288-289]

Examination was made of the sputum of 46,322 Formosan Chinese and 2,671 Japanese school-children with infection found in 0.64 per cent. of the first and in one child only of the second group. Taken cent. of the first and in one child only of the second group. Taken school by school the percentage of infection varied from 0 to 6.25. All but three of the infected admitted eating fresh water crabs and the children of fishmongers were more often infected than were others. Age increased the rate. There was physical and mental deterioration believed to be proportional to the weight of infection. The former showed itself by wasting cough in 90 per cent. blood in sputum in 30 per cent. pains in the chest in 20 per cent. other complaints being incapacity for exertion and asthma. The latter was seen in lowered capacity for solving problems or original thinking and poor memory. The table of contents wrongly refers to the infection as with *Clonorchis*.

VAN DEN BERGHE (L.) & DEXECRE (K.) *Dicrocoelium dendriticum* (*Fasciola lanceolata*) chez l'homme et les singes au Congo Belge. [*D. dendriticum* in Man and Monkeys in the Belgian Congo.]—*Ann. Soc. Belge de Méd. Trop.* 1938, Sept. 30 Vol. 18 No 3 pp. 509-514 With 1 plate. [17 refs.]

Eggs of *D. dendriticum* have been found in faeces of two Europeans in the Belgian Congo probably the result of eating uncooked vegetables but not in any of the negro inhabitants, who eat these well cooked. They have also been found locally in *Pan satyrus*, *Papio* and *Cercopithecus* and in one instance of each of the last two monkeys autopsy displayed a duodenal and not a biliary habitat. Local infection of sheep and snails remains to be sought for. C. L.

VELHARTS (Walter) Der Invasionsweg der Lanzettegelschmarie bei der Infektion des Endwirtes und ihre Entwicklung zum *Dicrocoelium lanceatum*. [The Infection of the Definitive Hosts by Cercariae of *D. lanceatum* and their Development.]—*Ztschr. f. Parasitenk.* 1938, Oct. 17 Vol. 10 No. 4 pp. 476-514 With 14 figs. [18 refs.]

YELLOW FEVER.

PRÉCIS OF ABSTRACTS IN THIS SECTION

JAMES (p. 631) gives figures of reported cases in America and Africa and shows that all cases in South America in 1938 were of the jungle type transmitted in the absence of *Aedes aegypti*. Vaccination is at present the only practicable method of protection and for this purpose the culture virus strain 17D which produces only slight reaction, has been used on over 1,000,000 persons. It has also been used in London.

The eastern boundary of the yellow fever area in the Sudan may extend into Abyssinia.

The Institut Pasteur of Brazzaville (p. 632) reports that the Brazza strain is the same as the Dakar strain. Protection tests show that yellow fever is widespread in the Province. There is probably some animal reservoir and infection may be transmitted by insects other than *Aedes*, though once it is established in man *Aedes* seems to be responsible for the typical epidemics.

SOPER (p. 633) points out that in South America rural yellow fever transmitted by *Aedes aegypti* and jungle yellow fever occurring in the absence of this mosquito are responsible for maintaining the non-urban endemicity. Control is based on viscerotomy, anti-*Aedes aegypti* measures and vaccination. FINDLAY (p. 633) states that in both Africa and South America the sera of 20-25 per cent. of wild monkeys in endemic areas contain yellow fever immune bodies and in America some species are very susceptible to infection. True jungle yellow fever has not yet been found in Africa. Both Findlay and Soper give figures of vaccination results, which are very satisfactory.

SCHUPPNER (p. 634) uses a 10 per cent. suspension of virus in the mouse protection test instead of 20 per cent.

VAN DEN BERGHE (p. 634) found no immune bodies in 84 human sera from Ruanda Urundi, but found one *Colobus* monkey positive in the Congo.

NICOLAU (p 635) considers the virus of yellow fever to be a coccus which by agglutination in the cells form the characteristic inclusion bodies. HINDLE however points out that filtration shown the size of the particles of the virus to be between 18 and 27 μ , i.e. one-tenth of the limit of resolution of the visual microscope.

FINDLAY and MACCALLUM (p 635) record spontaneous variation a neurotropic strain of yellow fever virus between the 670th and 750th passages in mouse brain into one which gave lesions in monkeys characteristic of pantropic strains. The importance of testing the pathogenicity of strains for human immunization is stressed. SCHÜFFNER *et al* (p 636) have maintained a viscerotropic strain which has remained true to type in *M. rhesus* (alternately dried *in vacuo*) and in mice for 405 subinoculations. Dried neurotropic virus kept *in vacuo* has been found to be still virulent after 5 years. DA FONSECA (p 636) has found the Asibi strain to persist up to 43 days in guinea pig testes.

HÖRING (p 636) finds that urea inactivates the virus the effect depending on the urea concentration, virus dilution and duration of contact. The action of urea in human blood cannot be entirely denied, and this effect of urea suggests that the virus may be of a protein nature.

WHITMAN (p 637) by experiments on the feeding of *A. aegypti* at material times on man and monkeys vaccinated with virus 17D and on the immersion of larvae in strong suspension of the virus concludes that there is little danger of the transmission of that virus by the mosquito. Similar conclusions are reached by PELTIER *et al* (p 637) using a neurotropic strain which is employed for vaccination in West Africa.

FINDLAY and MACCALLUM (p 638) discussing the possibility of the transmission of yellow fever by other arthropods report that the virus persists for 15 days in the abdomen of the cockroach *Blattella germanica* and that monkeys may be infected by intra-gastric introduction of virus. It is well known that monkeys eat small insects.

CALLOT (p 638) reports the finding of *Aedes gemiculatus* (a proved vector of yellow fever) in parts of France and describes its breeding places. ROUBAUD *et al* (p 638) found that specimens of *Aedes gemiculatus* kept at 20°-22°C (after an initial period of 5 days at 30°C) for 18 and 22 days after feeding on blood containing yellow fever virus were not infective by bite though the virus had survived in their bodies. BENNETT *et al* (p 639) demonstrated that *Aedes triseriatus* is an efficient vector but there is some evidence of attenuation of the virus in it.

SHANNOV (p 639) describes methods for collecting and feeding jungle mosquitoes for use in experiments. CARNAHAN (p 640) reports on mosquitoes trapped in Florida over a period of 2 years most of which were *Aedes*. He describes the traps used. WELCH (p 640) details the insects found in aircraft in Florida. No *Aedes* were found.

STEVENSON (p 640) found the chief lesion in the nervous system in yellow fever to be perivascular haemorrhage in the brain. Changes in the nerve cells were insignificant and he considers that there was no definite evidence of neurotropism in this series. MONTENEGRO (p 641) describes the Councilman Rocha Lima cell and others which resemble it subdividing these into identifiable atypical and suspect-atypical.

VAN DEN BERGHE (p. 641) prefers a 20 per cent. suspension of virus to a 10 per cent. suspension in the intraperitoneal mouse protection test. Serum is diluted 1 in 7. Controls with both normal and immune serum are indispensable. He also (p. 642) discusses the diagnosis in a suspected case in the Congo.

JADIN and ARNALDI (p. 642) discuss an outbreak, in the Congo which they conclude to have been of atypical yellow fever though only 1 of the 17 patients gave a definitely positive mouse protection test.

ROSS (p. 643) points out that as the sampling of populations for the mouse protection test in Africa is as yet incomplete certain areas are proclaimed as suspect by the Union Government. Aedes control is so difficult that the disinsection of aircraft is necessary. He describes the procedure at Durban, and discusses disinsection plants carried in the aeroplanes. The abstract should be read in full. In the *Public Health Reports* (p. 646) are given the regulations to be observed by air passengers in Florida and HARGETT (p. 646) deals with the same subject. CUMMING (p. 647) describes in detail the possible harbourages for mosquitoes both inside and outside certain types of aeroplanes in America. The number of such places is too large for further abstract.

ROBINEAU (p. 648) recapitulates anti-yellow fever measures in Senegal.

In the *Bulletin de l'Office International d'Hygiène Publique* (p. 648) it is stated that the results of protection tests in domestic animals do not affect the specificity of these tests in man.

SARTH *et al* (p. 648) describe the method of culture of strain 17D and the procedures for preparation of the vaccine. Circulating virus may be found in the blood of those vaccinated up to the 10th day but was not found at any time in 17 of 29 men. Antibodies developed within 28 days in all the subjects tested. The minimum dose necessary for successful vaccination is between 14 and 140 m.l.d. for mice and antibodies were still present after one year in a group tested. Reactions to this vaccine are mild. PELTIER (p. 650) gives figures which indicate the specificity of the mouse protection test for human sera, and of the results of vaccination with Laigret's phosphate vaccine and egg vaccine which, judged by protection tests, give strong protection in 95 per cent of cases. It may be advisable to repeat the vaccination every two years. DONOVAN (p. 650) reports on vaccination in America with virus attenuated by prolonged cultivation on media containing fowl embryo tissue. Reactions were slight.

FINDLAY *et al* (p. 651) consider that the aetiological agent of infective hepatitis is a virus. This has been found contaminating pooled measles serum and the occurrence of jaundice following yellow fever immunization has been traced to a filterable hepatotoxic agent in the culture medium which contained apparently normal human serum. Pools of apparently normal serum should not be used unless the medical history of all donors can be followed for at least one month.

DA FONSECA and ARTIGAS (p. 652) give results of tests of susceptibility of various Brazilian wild mammals to yellow fever virus. These cannot be further abstracted. They (p. 653) found that two young cats were susceptible to intracerebral injection of neurotropic virus whereas negative results had previously been obtained in Europe. DA FONSECA (p. 653) found the rodent *Ctenomys brasiliensis* to be very susceptible to neurotropic virus.

JAMES (S. P.) Renseignements sur la fièvre jaune reçus au cours de la période de neuf mois finissant le 30 septembre 1938. [Information on Yellow Fever received during the Period of Nine Months ending September 30th, 1938.]—*Bull. Office Internat. d'Hyg. Publique* 1938. Nov Vol 30 No. 11 pp 2537-2541
With 1 map

Cases of yellow fever notified during the nine months ending 30th September 1938 are indicated in the following table —

SOUTH AMERICA

Country	State	No of localities with cases	No of cases	No of deaths
Brazil	Minas Gernes	43	—	161
	Pará	1	1	1
	Santa Catharina	2	—	23
	Rio de Janeiro	32	61	58
	São Paulo	5	20	—
	Federal District	2	2	2
	Cayna	1	12	3
	Amaronas	2	2	2
British Guiana	Rupununi District	Suspected jungle cases since beginning of the year		
	Georgetown	1	2	1
Colombia	Cundinamarca	5	12	12
	Santander	1	1	1
	Santander del Sur	1	1	1

AFRICA.

Belgian Congo		2	15	9
French Equatorial Africa	Oubanghi-Chari	1	1	1
French West Africa	Dahomey	1	1	1
	Ivory Coast	6	7	6
	Niger	1	1	—
	Senegal	2	2	1
	Sudan	1	1	1
British West Africa	Gambia	1	1	—
	Gold Coast	13	16	15
	Nigeria	4	5	4

The occurrence of yellow fever in British Guiana is of interest in view of the results of protection tests in Dutch Guiana [see this *Bulletin* 1939 Vol. 38 p 22]. Cases resembling jungle yellow fever are reported as occurring among the Indians in the Rupununi district and 5 out of 46 sera gave a positive protection test.

In Brazil the disease has a very wide distribution and Dr SOPER is of the opinion that the 250 deaths during the first part of 1938 indicate

at least 15 000 cases of yellow fever. All the cases occurring in South America during 1938 belonged to the jungle variety transmitted in the absence of *Aedes aegypti*.

It is evident, therefore, that at present vaccination offers the only practicable method of protection, and up to the end of September 1938 almost 1 000 000 persons had been vaccinated by the culture virus strain 17D. This vaccine produces only a slight reaction, and in at least 95 per cent. there is a certain degree of immunity after a week which increases up to the 20th day at least.

In London 3,500 have been vaccinated by the same method since September 1937 without any cases of jaundice having been observed, the previous cases probably being the result of an adventitious hepatotoxic virus present in the human serum used in making the vaccine suspensions. (See also FINDLAY *et al* below p 651.)

Positive protection tests have been obtained with sera from the Anglo-Egyptian Sudan collected from natives in villages between the White Nile and the Abyssinian frontier and this suggests that the Eastern boundary of the yellow fever area may extend into Abyssinia. It is also of interest that in Malakal during 1933 only one positive serum was found out of 50 examined, whilst in 1938, 21 out of 114 sera were positive.

E Hinds

**BRAZZAVILLE AFRIQUE EQUATORIALE FRANÇAISE RAPPORT SUR
LE FONCTIONNEMENT DE L'INSTITUT PASTEUR DE BRAZZAVILLE
PENDANT L'ANNÉE 1937 [SALEUN (G)] pp 57-73 With 1
folding map—Fièvre jaune. [Yellow Fever]**

An interesting summary of work on the epidemiology of yellow fever in French Equatorial Africa, including an account of the isolation of the virus from a European case of the disease occurring at Brazzaville by intracerebral inoculations of the blood into mice.

This virus, known as the "Brazza" strain has now been passaged 29 times during 1937 and regularly produces paralysis on the sixth day. Cross-immunity tests showed the identity of this strain with that isolated at Dakar. Attempts to infect guinea-pigs showed the possibility of its becoming adapted in this animal: a single experiment with a porcupine *Athysanella africana* gave negative results.

In addition a certain number of protection tests were carried out in the villages and confirm previous observations supporting the view that yellow fever has a widespread distribution in this Province. Eighteen Europeans were examined and all gave negative results including one subject who nine years previously was supposed to have had an attack of yellow fever.

Four persons vaccinated by Lagret's method three years previously were examined. One neutralized 640 mouse units and another 6 400 units: the remaining two had completely lost any protective properties.

Four other persons vaccinated with virus and immune serum 18 months previously gave negative results in three cases one only showing an immunity titre of 640 units.

Sero-protection tests with the blood of 15 cattle from the Tchad region gave 10 negative, 4 positive with titres of 640 mouse units, and 1 positive against 6 400 units. Two gorillas, 3 chimpanzees, 1 baboon, 1 Cercopithecus, 1 Cynosurus, and 2 porcupines gave negative results.

In conclusion the author points out that it is necessary to abandon the old view that the cycle of infection is man *Aedes*-man. It seems probable that there is some animal reservoir of the virus and that infection may be transmitted by other insect vectors although once established in man *Aedes aegypti* seems to be responsible for the development of the typical epidemics.

E H

SOPER (Fred L.) Yellow Fever the Present Situation (October, 1938) with Special Reference to South America.—*Trans Roy Soc Trop Med & Hyg* 1938 Nov 28 Vol 32. No 3 pp 297-322. With 1 graph & 10 maps [21 refs.] Discussion pp 323-332.

A summary of our present knowledge of yellow fever with special reference to the work of the Rockefeller Foundation in South America. It is mentioned that in 1915 a programme of eradicating yellow fever from the Americas was begun by collaborating in the organization of anti *Aedes aegypti* measures in the few remaining seed-beds of infection. This programme seemed to succeed in various countries but failed to eradicate yellow fever from Brazil where two previously unrecognized epidemiological types rural yellow fever transmitted by *Aedes aegypti* and jungle yellow fever occurring in the absence of this mosquito were found to be responsible for maintaining non urban endemicity. The problem of rural *aegypti*-transmitted yellow fever has been solved by the extension of measures against this mosquito to the rural areas of north-east Brazil, the only region in South America where this type has been found.

Jungle yellow fever has also been found in Paraguay, Bolivia, Peru and Colombia and almost certainly occurs in Ecuador, Venezuela, Panama, British Guiana and Dutch Guiana. It has been observed in South Brazil as a wave-like phenomenon involving many of Brazil's richest districts in the years 1934-1938.

Control in Brazil is based on viscerotomy, anti-*aegypti* measures and yellow fever vaccination. As a result of viscerotomy over 140 000 liver tissues have been examined for yellow fever lesions since 1930 and more than 800 000 persons have been vaccinated during the first nine months of 1938 with satisfactory results and without serious complications of any kind [see JAMES above].

Finally the author stated that the threat of extension of yellow fever from present endemic regions of Africa to the ports of East Africa and to the Orient is sufficiently important to call for the application of these three methods to meet it.

In the discussion Dr G M FINDLAY stated that the problems in Africa were essentially similar to those in South America. The endemic zone in Africa comprised an area of about 4 000 000 square miles extending up to the Abyssinian frontier. There was also evidence that in the Malakal region yellow fever had been present within the past five years shown by the increase in the percentage of sera containing immune bodies. Whilst in both Africa and South America from 20-25 per cent of wild monkeys in endemic areas contain yellow fever immune bodies there is the striking difference that in South America some species are very susceptible to infection and show well marked clinical symptoms. In Africa the only species reacting in this manner is the Barbary ape which living north of the Sahara is not exposed to infection. True jungle yellow fever has not yet been

found in Africa but in many parts *Aedes aegypti* occurs both domestically and non-domestically

With reference to vaccination 5 700 Europeans have been immunized and no case of yellow fever has been known to occur amongst them, although between 35 and 40 cases of the disease have been recorded from non-immunized persons in the same districts. It is suggested that it might be possible to attempt immunization of the larger towns such as Lagos, Accra and Freetown, since these are potentially dangerous centres for the spread of infection.

The original article should be consulted for further points of interest discussed in this paper which do not lend themselves to abstraction.

E H

SCHUFFNER (W) Yellow Fever—Some Remarks on Dr Soper's Paper.—*Trans Roy Soc Trop Med & Hyg* 1939 Feb 28. Vol. 32. No. 5 pp 587-594

A discussion of the previous paper with special reference to statements in the article by SCHUFFNER, WALCH SORDRAGER and HOEKSTRA (see this *Bulletin* 1939 Vol 36 p 25). The author agrees with the specificity of the mouse protection test but considers that it is preferable to use a 10 per cent suspension of virus instead of 20 per cent in order to detect very small quantities of immune bodies. [See also VAN DEN BERGHE below p 641]

E H

VAN DEN BERGHE (Louis) Recherche de l'immunité amarile dans les territoires sous mandat du Ruanda Urundi. [Studies on Yellow Fever Immunity in the Mandated Territories of Ruanda Urundi].—*Ann Soc Belge de Méd Trop* 1938. Dec. 31 Vol. 18 No. 4. pp 683-685

The author mixed 50 sera collected from natives in the Ruanda Urundi territory especially in the east and on the Uganda frontier. The individuals were all 20-30 years old, and their sera did not contain any yellow fever antibodies. Another 35 sera collected from other parts of the territory were also negative with the exception of that of one individual who had lived outside the area. Accordingly there is no evidence of the existence of yellow fever immunity in the Ruanda Urundi.

This eastern limit of the disease in the Congo is difficult to explain, since it does not depend on the absence of *Aedes*. With reference to the selection of Entebbe by the Rockefeller Commission as a site for the study of this problem, the author considers that it is too far east of the endemic area and it would be preferable to choose a site such as Wan in the Anglo-Egyptian Sudan or Kilo-Bambu in the Belgian Congo.

E H

VAN DEN BERGHE (Louis) Substances de protection amarile dans le sérum d'un singe au Congo belge [Yellow Fever Anti-Bodies in the Serum of a Monkey from the Belgian Congo].—*Ann Soc. Belge de Méd Trop* 1939 Mar 31 Vol. 19 No. 1 pp 91-95

The author examined the sera of 11 monkeys including 5 chimpanzees, 4 baboons, a *Cercopithecus* and a *Colobus* monkey from the Belgian Congo. Eight of these monkeys came from regions where

yellow fever antibodies were found in the majority of young adults of the native population but only one of the monkeys a *Colobus polykomos* gave a positive protection test. E H

NICOLAU (Stéfan) Données sur la morphologie du virus de la fièvre jaune et sur la morphogénèse des inclusions qu'il provoque dans les tissus. [Notes on the Morphology of Yellow Fever Virus and of the Inclusions that it provokes in the Tissues.]—*C. R. Acad. Sci.* 1938. Oct. 24 Vol. 207 No 17 pp 750-752.

A study of sections stained by methyl blue and oxalate acid fuchsin of the tissues of mice guinea-pigs and monkeys dead of yellow fever leads the author to conclude that the virus is a small coccus. These agglutinate in the cells, and there degenerate forming the characteristic inclusion bodies.

In mice the brain was often found to contain voluminous inclusions without any internal structure coloured a deep red and occupying nearly all the nuclei of the cells of the choroid plexus and similar appearances were noted in the glial cells. In certain nuclei however very small cocci were found sometimes in chains of three to five individuals whilst in other parts of the nuclei dense masses of them or fragments of chromatin were present. Similar appearances were observed in guinea-pigs and the neurones showed transition stages from masses of the cocci to intranuclear bodies. The hepatic cells of monkeys do not give as clear results as the brains of mice and guinea-pigs but will be the subject of further study.

[These notes ignore the fact that the particles of yellow fever virus have been shown by filtration experiments to lie between 18 and 27 μ , which is approximately one tenth the limit of resolution of the visual microscope.] E H

FINDLAY (G M) & MACCALLUM (F O) Spontaneous Variation in the Neurotropic Strain of Yellow Fever Virus.—*Brit. J. Experim. Path.* 1938. Dec. Vol. 19 No 6 pp 384-388. [12 refs.]

A record of the occurrence of spontaneous variation in a neurotropic strain of yellow fever virus whereby it suddenly acquired viscerotropic properties.

A rhesus monkey was inoculated intracerebrally with a neurotropic strain of the virus that had been continuously passaged in mouse brains for five and a quarter years, involving some 750 consecutive passages during which it regularly produced neurotropic symptoms whenever it had been tested in monkeys. On this occasion however the monkey died on the 5th day after inoculation without showing any nervous symptoms but with the typical symptoms produced by the ordinary pantropic virus, such as liver necrosis haemorrhages in the stomach etc. Nevertheless the serum and liver of this monkey injected intracerebrally into mice produced encephalitis, not after an interval of 7-9 days as is the case with the true pantropic strain, but after 4 to 5 days, the interval characteristic of the well-established neurotropic strain. After four further passages in mice this virus was inoculated into a rhesus monkey and again produced death without the development of nervous symptoms but with the characteristics of the pantropic strain. On a third occasion after five further passages in mice, similar results were obtained. The examination of frozen

and dried virus that had been preserved showed that after 670 consecutive mouse brain passages the virus still produced neurotropic symptoms in monkeys; therefore this variation occurred spontaneously between the 670 and 750 passages.

[It is hardly necessary to stress the extreme importance of these results, which emphasize the necessity of testing the pathogenicity from time to time of all strains of yellow fever virus used for human immunization.] E H

SCHULTNER (W.) SNIJERS (E. P.) & WALCH SORGDRAGER (B.)
The Effect of Continued Subinoculation of Yellow Fever Virus and its Longevity in a Preserved State.—*Trans. Roy Soc Trop Med & Hyg* 1939 Feb. 23. Vol. 32. No. 5 pp. 595-596.

The authors have maintained the Dakar strain of yellow fever virus since 1928 in its viscerotropic state alternately in *M. musculus* and dried *in vacuo*. A substrain has also been kept by uninterrupted inoculations in mice and has now reached the 405th subinoculation. Both these strains have remained true to type and also are indistinguishable from a strain of the same origin that has been maintained for about 600 subinoculations in Professor Hudson's laboratory in New York.

Samples of neurotropic virus dried over phosphorus pentoxide and then kept in sealed tubes, from which the air was removed before sealing have been found to retain their virulence completely unimpaired for a period of no less than five years! E H

DA FONSECA (Flavio) Persistance de la vitalité du virus amaril inoculé dans les testicules du cobaye. [The Persistence of Virulence of Yellow Fever Virus when Inoculated into the Guinea-pig's Testes.—*C R Soc Biol* 1939. Vol. 129 No. 34 pp. 1146-1148.

Six mice and an opossum, *Didelphis aurita* were inoculated intratesticularly with the Asibi strain of yellow fever virus and 12 days later their testes examined for the presence of virus with negative results. A guinea-pig similarly inoculated showed the presence of virus in its testes after 14 days.

Neurotropic virus was found to persist in the testes of inoculated guinea-pigs in some cases up to 43 days, but in one case the virus had disappeared by the 30th day. E H

HORING (F. O.) The Action of Urea on Yellow Fever Virus.—*Trans Roy Soc Trop Med & Hyg* 1939 Feb. 23. Vol. 32. No. 5 pp. 587-589.

An account of experiments showing that yellow fever virus is inactivated by exposure to solutions of urea. Suspensions in serum saline (1:10) of mouse brains infected with the neurotropic strain, after filtration through Sertz K pads, were mixed with varying concentrations of urea, the mixtures kept at 37°C. for different periods and then inoculated intracerebrally into mice.

In one experiment 40 per cent. urea solution was mixed with falling dilutions of virus. With a dilution of 10^{-8} inactivation was complete in 60 minutes. In addition, the period to death was prolonged at least 1 or 2 days in the case of mice injected with mixtures containing urea.

When the concentration of urea was reduced the time required to inactivate the virus increased considerably with a 40 per cent.

solution and 10^{-2} virus dilution inactivation began after 30 minutes whilst with 20 per cent. it required 150 minutes to produce a similar result. The attenuated pantropic tissue culture virus was found to be much more easily inactivated for with 40 per cent urea inactivation was perceptible immediately and was complete in 20 minutes.

The effect depends on the urea concentration virus dilution and duration of contact. Although in human blood the amount of urea is not more than 30-40 mgm. per 100 cc. in febrile cases its action cannot be entirely denied since it acts for longer periods on the virus. The fact that urea inactivates yellow fever virus as it denatures proteins suggests that this virus may be of a protein nature. E H

WHITMAN (Loring) Failure of *Aedes aegypti* to transmit Yellow Fever Cultured Virus (17D). — *Amer J Trop Med* 1939 Jan. Vol. 19 No 1 pp 19-26

A description of experiments to test directly the capacity of *Aedes aegypti* to become infected when fed on volunteers vaccinated against yellow fever with vaccine virus 17D.

Of 8 patients fed on by mosquitoes on the 6th and 7th days after vaccination 2 had minimal amounts of virus in their blood on the 7th day. None of the mosquitoes fed on these patients became infected.

Twelve lots of mosquitoes were fed on rhesus monkeys after vaccination in the case of 5 lots of mosquitoes when the virus in the blood was as great or greater than in a series of human cases but none of them became infected. Four attempts were made to infect *Aedes* in the larval stage by immersing them in a strong suspension of vaccine virus. The adults emerging from the two most concentrated suspensions were found to contain virus but were unable to transmit the infection by bite. None of the three monkeys infected by the suspensions of the ground up mosquitoes had any fever nor was there any increase in circulating virus as a result of the single passage in the bodies of the mosquitoes.

It would seem therefore that there is very little if any danger of *Aedes aegypti* transmitting the 17D virus. E H

PELTIER (M) DURIEUX (C) JONCHÈRE (H) & ARQUÉ (E.) La transmission par pique de *Stegomyia* du virus amaril neurotrope présent dans le sang des personnes récemment vaccinées est-elle possible dans les régions où ce moustique existe en abondance? [Is the Transmission of Neurotropic Yellow Fever Virus, in the Blood of Recently Vaccinated Persons Possible by the Bite of *Stegomyia* in Regions where this Mosquito is Abundant?] — *Rev d'Immunologie* Paris. 1939 Mar Vol. 5 No 2. pp 172-195 With 12 charts.

A description of experiments in French West Africa to determine whether there was any possibility of *Aedes* becoming infective after feeding on the blood of persons vaccinated against yellow fever.

The authors repeatedly fed mosquitoes on numerous vaccinated subjects whose blood was shown to contain neurotropic yellow fever virus and after intervals of from 2 to 23 days attempted to infect 8 rhesus monkeys by the bites of these mosquitoes with uniformly negative results.

In a second series of experiments 2 rhesus monkeys were inoculated subcutaneously and another 2 intraperitoneally with the ground up contents of these mosquitoes. One of the monkeys inoculated intraperitoneally became infected but the other 3 remained well.

The results of these experiments confirm the view also supported by five years practical experience that the use of neurotropic yellow fever virus for vaccination does not involve any risk of infection to the general population, even in regions where *Aedes* is common. E H

FINDLAY (G M) & MACCALLUM (F O) Epidemiology of Yellow Fever
[Correspondence].—*Nature* 1939 Feb 18. Vol 143 No 3616
p 239

The persistence of yellow fever infection in rural areas during dry seasons when adult mosquitoes are either absent or present in very small numbers, suggests that other arthropods may possibly harbour the yellow fever virus, but hitherto none has been found to do so.

The authors record two recent observations suggesting that non-biting arthropods may be possible vectors. In the first place it has been found possible to infect monkeys, *Macaca mulatta* and *Cercopithecus aethiops* by introducing the yellow fever virus into the stomach by means of a soft catheter. The virus passed into the blood stream and, in the case of the Indian monkey, produced a fatal infection. Negative results were obtained in similar attempts to infect, by the alimentary tract man, dog rabbit guinea pig, rat mouse hen and pigeon.

Secondly it was found that when yellow fever virus was injected into the abdomen of the cockroach (*Blattella germanica*) kept at 19°C. the virus retained its activity for at least 15 days. It is well known that monkeys in addition to their vegetarian diet, feed on grubs and insects and, in view of the above observations it would be of interest to determine exactly what animal foods are eaten under natural conditions by monkeys in the yellow fever areas of Africa and South America. E H

CALLOT (J) Sur quelques gîtes et associations larvaires de moustiques.
[Breeding Places of Mosquito Larvae].—*Ann. Parasit. Humains et Comparés*. 1939 Jan. 1 Vol 17 No 1 pp. 86-87

Aedes geniculatus has been found in the Department of Indre-et-Loire in different parts of Alsace and in Seme-et-Oise. It breeds in rock holes in which the water contains rotting vegetable matter and resembles that found in tree holes. [*Aedes geniculatus* has been shown to be an efficient vector of yellow fever see this *Bulletin* 1938 Vol 35 p 117] C H

ROUBAUD (Emile) COLAS-BELCOUR (Jacques) & STEFANOPOULOU (Georges-Jean) Le comportement du virus de la fièvre jaune chez le moustique *Aedes geniculatus*. [The Behaviour of Yellow Fever Virus in the Mosquito *Aedes geniculatus*.]—*C. R. Acad. Sci.* 1939. Dec 12 Vol 207 No 24 pp 1144-1146

The authors previously showed that this species is capable of transmitting yellow fever by its bite [see this *Bulletin* 1938 Vol 35 p 117] but in that experiment the mosquitoes were kept at 30°-35°C

A second series of *Aedes geniculatus* was fed on blood containing yellow fever virus and after five days at 30°C kept at 20-22°C. On the 18th and 22nd days respectively after this infective feed the mosquitoes were fed on a normal monkey and produced neither infection nor immunity. The intracerebral inoculation into mice of the contents of five of these mosquitoes produced yellow fever encephalitis showing that although these insects had not become infective by bite the virus had survived within their bodies. E H

BENNETT (Byron L.) BAKER (Fred C.) & SELLARDS (Andrew Watson)

The Behaviour of the Virus of Yellow Fever in the Mosquito *Aedes triseriatus*.—*Science*. 1938 Oct 28 Vol. 88. No 2287 pp 410-411

— & — The Susceptibility of the Mosquito *Aedes triseriatus* to the Virus of Yellow Fever under Experimental Conditions.—*Am Trop Med & Parasit* 1939 Mar 31 Vol. 33 No 1 pp 101-105

Specimens of *Aedes triseriatus* Say, a nearctic mosquito ranging throughout the East of the United States were fed on rhesus monkeys infected with yellow fever and subsequently fed on normal monkeys.

In the first experiment with an incubation period of 17 days at 28°C six of these mosquitoes were fed on a normal monkey which showed a slight febrile reaction six days later then without any other symptoms being noticed died of yellow fever 36 days after having been bitten.

In a second experiment four monkeys were bitten by mosquitoes that had fed on an infected animal 14 to 15 days previously. Two of these monkeys died of yellow fever after intervals of 10 and 13 days during which they showed no signs of disease. The other two monkeys showed no signs of infection and did not develop immunity. In this experiment the mosquitoes producing infection had been kept for 14 to 15 days at 37°C. after ingesting the virus whilst those monkeys which survived had been bitten by mosquitoes kept for the same period at 28°C.

Mosquitoes that had fed on infected monkeys were tested for the presence of virus after 13 to 16 days by grinding them up and inoculating the suspensions into the brains of white mice. Virus was recovered from 6 out of 10 mosquitoes.

These experiments show that *Aedes triseriatus* is an efficient carrier of yellow fever but there is some evidence of attenuation of the virus in this mosquito. E H

DOMINGUEZ (F) Trois points importants dans l'histoire de la découverte de la transmission de la fièvre jaune par le moustique [Three Important Points in the History of the Discovery of the Transmission of Yellow Fever by the Mosquito].—*Bull Acad Med* 1938 Nov 15 102nd Year 3rd Ser Vol. 120 No. 33 pp 303-307

SHANNON (Raymond C.) Methods for collecting and feeding Mosquitoes in Jungle Yellow Fever Studies.—*Amer J Trop Med* 1939 Mar Vol. 19 No 2 pp 131-140 With 4 figs on 2 plates.

A description of the methods used for capturing transporting classifying and feeding the mosquitoes used in experiments to determine whether or not yellow fever infection could be produced in laboratory

animals by the bite of jungle mosquitoes within 24 hours after their capture.

A horse was used as bait for the capture of day-flying sylvan mosquitoes and details are given of the muslin cloth and mosquito net trap in which it was enclosed. The denser and more humid parts of the jungle were found to be the most favourable sites.

The original paper should be consulted for details of the transportation and feeding of the mosquitoes.

Usually one-half or more of *Mansonia* and *Aedini* fed, whilst only about one-quarter of *Sabethine* mosquitoes would take blood.

It was found that a staff of eight persons could tube, classify and feed between 2,000 and 3,000 mosquitoes per day. E H

CARNAHAN (Charles T) A Two-Year Record of Adult Mosquito Trapping in Dade County Florida.—*Public Health Rep* 1939 Apr 14 Vol. 54 No 15 pp 606-611

Adult mosquitoes which visit light have been trapped at Miami Florida without intermission for two years.

The author used six New Jersey traps—these consist essentially of an electric light visible from all sides, together with a fan which sweeps down the insects which come towards the light and delivers them into a cyanide bottle. The results of two years' work are shown in a table which gives monthly totals for all traps together, the species of mosquito being shown separately. Twenty-three species were captured, all of them known previously to occur in the locality.

In two years the traps took nearly a quarter of a million mosquitoes. About 38 per cent. belonged to the species of *Aedes* which bred in salt marshes and which were most abundant in summer. 5.9 per cent. were *Anopheles* of four species, of which *crucians* was commonest; these insects were commoner in the colder months. Over 40 per cent. of the total catch was made up of various mosquitoes which do not bite man. The monthly totals ranged from below 400 to about 55,000. There was a striking reduction of mosquitoes in the second year which the author attributes to a period of dry weather. P A Buxton

WELCH (E V) Insects found on Aircraft at Miami, Fla., in 1938.—*Public Health Rep* 1939 Apr 7 Vol. 54 No 14 pp 561-568
[Summary appears also in *Bulletin of Hygiene*]

This is an interesting summary with a series of tables, showing the orders, genera and species of insects found, alive or dead, on aircraft arriving during 1938 at Miami from Central and South America and Mexico.

In brief, of 398 aircraft inspected 187 (47 per cent.) harboured insects; these totalled 651 and 168 of them were alive. Forty dead and five live mosquitoes were found among them. *Culex quinquefasciatus* (6 dead, 3 alive), *Mansonia sudubians* (18 dead, 1 alive) and 1 dead *Anopheles albimanus*; no *Aedes aegypti* were found. The most prevalent insect was the house-fly. H H S

STEVENSON (Lewis D) Pathologic Changes in the Nervous System in Yellow Fever.—*Arch Pathology* 1939 Feb Vol. 27 No 2 pp 249-266. With 9 figs.

A study of the whole brain from 20 cases of persons who died of yellow fever and of pieces of brain tissue from 14 additional cases.

A detailed examination of the brains of these 20 cases in 3 cases including the spinal cord is reported, from which it is shown that the chief lesion was perivascular haemorrhage. These haemorrhages were most frequent in the subthalamic and periventricular region at the level of the mamillary bodies. The temporal pole was next most involved and the cerebellum only slightly less so.

Perivascular lymphocytic exudate was noted in 9 cases but with the exception of a single case this was slight. Changes in the nerve cells were insignificant and no inclusion bodies were seen. Reactive changes in the microglia and astrocytes were slight.

The author concludes that in this series there was no definite evidence of neurotropism on the part of the yellow fever virus.

E H

MONTENEGRO (João) A cellula de Councilman-Rocha Lima [The Councilman-Rocha-Lima Cell].—*Brasil Medico* 1933 July 16 Vol 52. No 29 pp 652-654 English summary

The author defines once again what is to be understood as the typical Councilman Rocha Lima cell in the yellow fever liver. In tissue stained by haematoxylin and eosin it shows coagulative necrosis less angular and more rounded than the non-necrosed cell with a well marked edge and surrounded by a narrow clear halo. The cytoplasm is eosinophilic non-granular more refractile than normal and contains small vacuoles. The nucleus is smaller and more rounded than that of the normal cell, usually about the centre is homogeneous [i.e. shows no nucleolus] and stains a deeper red than does the cytoplasm. Rarely the cell is binucleate.

He then describes other cells which may be seen bearing greater or less resemblance to this and points out the differences. He thus makes two large divisions typical and atypical and sub-divides the latter into identifiable atypical and suspect atypical according to the degrees in which they deviate from the typical in respect of the size shape and staining of the nucleus the presence of vacuoles in the cytoplasm and its granularity and its size shape and staining properties.

H H S

VAN DEN BERGHE (Louis) Modifications techniques du test intrapéritonéal de protection amarile chez la souris [Technical Modifications of the Intraperitoneal Yellow Fever Protection Test in Mice].—*Ann Soc Belge de Méd Trop* 1939 Mar 31 Vol 19 No 1 pp 81-86 With 1 plate.

The author recommends some modifications of Sawyer and Lloyd's technique (see this *Bulletin* 1932, Vol 29 p 198) for the application of the intraperitoneal mouse protection test for yellow fever.

The serum to be examined is diluted 1/7 and the virus suspension is increased to 20 per cent. instead of the usual 10 per cent. [But this increase in strength was recommended by SAWYER himself in 1934. See this *Bulletin* 1934 Vol 31 p 837.] As a result of the small quantity of serum used it is usually possible to repeat the test when doubtful reactions are obtained.

The brains of infected mice are put in a sterile bottle containing glass beads and shaken until broken up when peptone water is added sufficient to make a 20 per cent. suspension. Then 0.5 cc. of the serum

to be examined is drawn up into a 5 cc. syringe followed by 3 cc. of the virus suspension in the bottle. When all the syringes have been used one for each lot of serum to be examined the mice are then injected in batches of 6 using 0.5 cc. for each mouse. The remaining 0.5 cc. in each syringe is kept in reserve for about half an hour in case it is necessary to inoculate another mouse. For controls the author considers it indispensable to set up two series one in which the virus is mixed with normal rabbit serum, and the other with a mixture of virus and immune rabbit serum. In these controls with normal serum 4 or more out of 6 should die of the infection and with immune serum not more than one. [See also SCHUFFNER, above p. 634]

E H

VAN DEN BERGHE (Louis). *Considérations générales sur le diagnostic de certitude de la fièvre jaune à propos d'un cas cliniquement suspect au Congo Belge* [General Considerations on the Certainty of Diagnosis of Yellow Fever with Special Reference to a Suspected Clinical Case in the Belgian Congo]—*Ann Soc Belge de Méd Trop* 1938, Dec 31 Vol 18 No 4 pp. 671-682 [11 refs]

The description of a fatal case of acute fever with jaundice, blood in the stomach and a pale liver with centres of sclerosis. The possibility of this being a case of yellow fever was investigated but the examination of liver tissue was negative and also there were no further cases of infection in the neighbourhood.

The author then gives a general discussion of the methods employed for the diagnosis of yellow fever including anatomopathological examination serological tests and the isolation of the virus, with special reference to their application in the Belgian Congo.

E H

JADIN (Jean) & ARNALDI (Enrico). *Une épidémie d'une affection ictérique à Zongo* [Possibilité d'une infection amarile atypique. An Epidemic of a Disease showing Jaundice at Zongo. The Possibility of Atypical Yellow Fever]—*Ann Soc Belge de Méd Trop* 1938, Sept 30 Vol 18 No 3 pp. 435-473 With 13 charts 1 plan & 1 map.

A detailed description of an epidemic which occurred during 1938 at Zongo a small frontier post of the Belgian Congo near Bangui where yellow fever is known to occur.

The clinical symptoms of 17 patients observed included pale and late jaundice early albuminuria which rapidly increased, and occasionally clots of blood in the stomach. The absence of any parasites in the blood or urine supported the view that it was a virus infection but the authors consider that the symptoms were not sufficiently definite in themselves to justify a diagnosis of yellow fever. There were 10 deaths out of 20 cases three of which were not seen. The results of the pathological examination of the livers of 4 cases (by Bablet) did not agree with the clinical symptoms, and all were negative as far as histological changes characteristic of yellow fever were concerned.

The results of mouse protection tests showed that the serum of only 1 patient gave a definitely positive reaction, but 3 or 4 gave feebly positive results.

The authors discuss the epidemiology of the disease and mention that 10 other patients were in contact with these cases but kept under mosquito nets and none of them became infected. Moreover the application of anti mosquito measures and anti yellow fever vaccination was followed by the disappearance of the epidemic. Accordingly they are of the opinion that it might be considered as an outbreak of atypical yellow fever

E H

Ross (G A Park) La destruction automatique des moustiques dans les aéronefs et le vecteur de la fièvre jaune dans les traversées aériennes en Afrique [Automatic Destruction of Mosquitoes in Aircraft and the Yellow Fever Vector in African Air Travel]—*Bull. Office Internat. d'Hyg. Publique* 1933, Sept. Vol. 30 No. 9 pp. 2002-2031. With 3 figs. [Summary appears also in *Bulletin of Hygiene*]

In this comprehensive paper Dr. Park Ross expresses his views on some of the problems which the advent of air travel in Africa has produced.

Naturally the possibility of the transmission of yellow fever to susceptible but hitherto uninfected areas raises problems for the health authorities which are new and not easily solved.

The author points out that whereas regular commercial air line services are comparatively easy to control private flights and planes chartered for passages not on the regular air routes, are not so readily brought within the scope of the medical authorities.

The present imperfect state of our knowledge of the distribution of yellow fever in Africa is considered, and the opinion expressed that insufficient sampling of populations by the mouse protection test has as yet been undertaken. Consequently certain areas have been proclaimed "suspect" by the Government of the Union of South Africa, these areas being those territories West of Longitude 35 East and North of Latitude 13 South and comprising any part of the Belgian Congo or Angola not included in the above.

Dr. Park Ross considers that unlike the problem in the Southern States of the U.S.A. the history of an air passenger from African territories is easy to ascertain, thus obviating the same risk in the unwitting conveyance of a human vector and reducing the health problem to one concerned almost entirely with the insect vector.

Conditions on the East Coast, both in urban and rural areas cause the South African Authorities considerable apprehension owing to the prolific breeding of *Aedes* and the heavy dhow traffic. Dhows are apparently notorious in their infestation with mosquitoes.

The difficulty of effective *Aedes* control in towns as well as in rural areas appears to be a problem baffling alike to authorities in the Southern U.S.A. and in Africa.

It is this factor more than any other that has led to the experiments in the disinsection of aircraft as a safeguard against the spread of yellow fever.

Measures taken at African aerodromes are in Dr. Park Ross's view apt to be nullified for such reasons as an insufficiency of recognized airports under control to avoid forced landings, the impossibility of ridding some aerodromes of breeding grounds (e.g. the Nile and Great Lakes) mosquito harbourage within insect flight range of the aerodromes but not under the control of the local authority and last

but not least the reluctance of some health authorities to inconvenience the air lines by disinsection of aircraft immediately on arrival and before landing passengers, cargo and mails.

Some idea of the prevalence of insects in aeroplanes can be gained from the results quoted of the inspection of 84 seaplanes arriving at Durban. In 40 no insects, in 28 living insects and in 16 dead insects were found. Of these insects culicines were found in five instances and anophelines and *Aedes* twice each.

Of the 84 planes quoted, 44 had received recent treatment with "Fht" either *en route* or at the last port of call by the Airway staff. It is to be noted that only 11 out of 40 planes arriving unsprayed brought in living insects.

An interesting description is given of the procedures taken at Durban on the arrival of aircraft. At present Durban is the southern terminus of the seaplane route of Imperial Airways.

The aircraft moor 300 yards from the shore and are required to keep hatches and doors closed. The Health Officer goes aboard and puts up an insecticide mist over one exit through which the passengers pass into a launch for conveyance to a quarantine pontoon. On the pontoon medical and immigration control is exercised, the pontoon being fitted with the requisite examination rooms etc. A medical card is filled in giving the usual details much as is done in the ordinary way with ships.

In the meantime a European Health Staff using high-pressure sprays, disinsects the plane a proceeding occupying about 20 minutes. After disinsection is completed baggage and mails may be handled.

Suspect passengers can be detained on the pontoon accommodation being provided for the purpose and the pontoon being moored off shore complete isolation can be maintained.

It is pointed out that the formalities connected with disinsection on arrival at an airport represent a certain loss in flying time and to obviate this disinsection in the air or just on landing has been tried.

Part II of the paper deals with Automatic Disinsection. In essential this comprises a plant for disinfection carried in the plane with fixed ducts leading to all compartments both for the dissemination and the removal by extraction of gases lethal to mosquitoes.

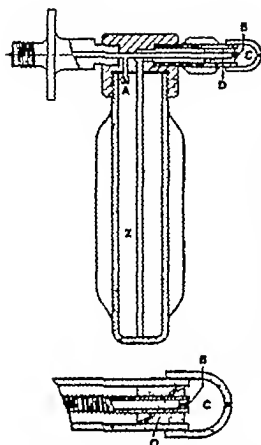
There are however certain primary difficulties to be overcome, particularly the weight of the apparatus, constructional problems and the difficulty of obtaining a really effective gaseous disinfectant. Atomized disinfectants are unsuitable for conveyance by lengthy ducts and the only reliable gas, HCN too dangerous for routine use even in dilutions suitable for killing mosquitoes.

The advent of a new type of seaplane built in effectively bulkheaded compartments partly solved one of these problems, for it was found possible to fumigate section by section while in flight.

Objections to power drive for the apparatus were overcome to some extent by the use of CO₂ as a propellant. The use of "sparklet" bulbs in this connexion is described, and the advantage of knowing that a standard charge, such as a sparklet will propel a standard amount of disinfecting solution into the space to be dealt with has obvious advantages.

It has been found to be quicker in action than aspiration types of apparatus.

Self-explanatory drawings of a Larmuth unit are given and it was found that a unit of this type for each compartment in a plane



Larmuth's Spray Ejector new type
(Reproduced half-size)

A syphon sparklet bulb containing CO_2 under pressure in excess of 400 lbs. per square inch provides the motive power. The measured dose (60 cc) of insecticide is placed in container Z. High pressure CO_2 enters Z through jet A and mixing chamber C through the "booster" jet B. Block D has two diagonal grooves cut in it to admit the insecticide forced up from container Z into chamber C. On reaching chamber C atomization occurs and is enhanced by the CO_2 under pressure escaping from jet B. [Positions of B and C are adjustable and all nozzles are easily accessible for cleaning.]

(Reproduced from *Bulletin de l'Office International d'Hygiène Publique*)

(weight 1 lb. each unit) was less in total than a large central installation with ducts to each compartment.

An ingenious type of machine the Phantomyst is also described, but for efficiency electric motor power is required and the weight is excessive.

Certain desiderata for insecticides must be insisted upon. These are —

- (1) Non inflammability
- (2) Non-clogging in the apparatus.
- (3) Quick killing in action
- (4) Non toxic to human beings.
- (5) Non-staining
- (6) Odourless within reason.

At present most insecticides have a concentrated pyrethrum extract base diluted with paraffin carbon tetrachloride or water. Large bulk should be avoided from considerations of weight and stowage.

Consideration is given at length to the fulfilment of the above postulates by these diluents with carbon tetrachloride coming first in order of merit.

Extensive tests in the flying boat *Cassiopeia* and others using Larmuth's Spray, old type and new type and Phantomyst plant were made with the plane at rest.

The solutions used were *Deskito* and *Pyagra*, and results are given in detail. It appears that complete disinsectization can be carried out in from 5-10 minutes.

In his summary and conclusions, Dr Park Ross finds —

(1) That under present conditions there is a risk of spread of yellow fever by aircraft in Africa.

(7) Conveyance by aircraft of living mosquitoes from one African territory to another should be prohibited by law

(8) Effective disinsection of aircraft is essential and should be capable of being done by unskilled hands the health authorities acting in a supervisory capacity only as in seaports.

(9) Experience shows that of the two—human factor insecticide and apparatus—the human factor is the least reliable and should be eliminated as far as possible.

(10) Automatic plant is aimed at eliminating the human factor and allowing disinsection by aircraft crews when in flight or on the ground.

(11) The essence of air travel is speed, and delay should be minimized as far as possible in carrying out health measures.

(12) Disinsection in flight prevents delay to disembarkation of passengers and freight on arrival

(13) Of insecticides tested, Aircraft Pyra and Water Soluble Daktto were equally non-inflammable the former was quicker in action more reliable and gave 100 per cent. kill in every case. Daktto was practically odourless

(14) Automatic propulsion of measured doses of insecticide as in Larmuth's ejector proved superior to aspiration types such as the Phantomyst.

(15) Experiments in the flying boat "Caslopla" showed that disinsection can be effectively carried out in from 5-10 minutes.

M T Morgan.

PUBLIC HEALTH REPORTS. 1938. Sept. 9. Vol. 53 No 36. pp 1621-1622 —Miami Health Officer acts to prevent the Introduction of Yellow Fever

Owing to the fact that the flight time of airplanes coming to Miami, Florida from actual or potential foci of yellow fever in South America, is now only ten hours, the local health officer has issued a special order regarding passengers. Any person coming to and remaining in Miami, who within six days previously has been in any district which the United States Public Health Service has declared an actual or potential focus of yellow fever must within 24 hours report in person to the Department of Public Health and be kept under surveillance until six days have elapsed. Should visitors stop temporarily in Miami and then proceed to some destination in the *Aedes aegypti* area of the United States the Miami authorities will notify the proper health authorities to keep such persons under surveillance until the six days have elapsed.

E H

HARGETT (M V) Surveillance des passagers des Aéronefs au point de vue de la fièvre jaune [The Inspection of Aircraft Passengers with Reference to Yellow Fever]—*Bull Office Internat d'Hyg Publique* 1938, Sept. Vol. 30 No 9 pp 1881-1886.

Details of the methods recommended by the Pan-American Sanitary Bureau including the necessity for each passenger except those vaccinated against yellow fever or otherwise immune being provided with a Certificate of Origin when travelling in aircraft from regions either infected or suspected of being infected with yellow fever. Persons coming from such districts must present this certificate, together with their passport and may be required to be kept under surveillance by the sanitary authorities for a period of six days.

E H

CUMMING (Hugh S.) Rapport sur les refuges pour moustiques dans les aéronefs [Report on Mosquito Harbourages in Aircraft.]—*Bull. Office Internat. d'Hyg. Publique* 1938. Sept. Vol. 30 No 9 1938-2001 With 6 figs. on 2 plates [Summary appears also in *Bulletin of Hygiene*]

The authors of this note communicated to the International Health Office Paris by Surgeon General Cumming formerly Surgeon General of the United States Public Health Service describe every point in five types of aircraft employed by the Pan American Airways which might conceivably form a harbourage for mosquitoes. First in the interior of the aircraft there are ten main harbourages (1) Running the length of each compartment under the floor is the hold divided in three parts by longitudinal bulkheads. The floor is not lifted for disinsection although there are holes in it which would permit the entry of mosquitoes into the bilges (2) In the toilet compartment there are built in cupboards and spaces around the washbasin and toilet pedestal. Disinsectizants would not penetrate into these spaces except by direct application (3) Window curtains drawers under the seats lifebuoys, and pockets in the seats make excellent mosquito harbourages. (4) The space between the ceiling and the pilot's cabin filled with packing as isolation against sound is in relation with the ventilation. The wire mesh partitions are insufficient to prevent the entry of mosquitoes. (5) The purser's office, sanitary bucket postal compartment crew's lockers and the battery space are fairly open and can be disinfected. (6) The ventilation system comprises openings on the leading edge of the wing conduits running the length of the aircraft with various occasional openings in the cabin and in each compartment. The screening of this system is insufficient, consisting of a lattice intended merely to prevent the entry of birds. (7) In the centre of the roof of each compartment is a longitudinal space opening into the cabin. This space is intended for protection against noise but is not freely accessible and might afford harbourage. (8) Above the roof on each side of the cabin are spaces used for cables running to the tail of the aircraft. (9) Forward of the pilot's cabin there is a space used for ballast. In some cases this space communicates with the cabin but is difficult to disinfect. (10) Spaces between the bulkheads separating the compartments offer possible refuges where disinfecting vapour would not easily penetrate.

With regard to the exterior surface of the aircraft modern types are effectively aerodynamic and offer but little harbourage to mosquitoes. Nevertheless there are certain points which might do so (1) Wings ailerons stabilizers rudders for direction and altitude are hollow and communicate with the interior by openings of about an inch in diameter the object of which is to equalise atmospheric pressure in the interior and exterior of the craft. (2) The interior is connected with the wings through the tower through which all the cables lead, going from the pilot's cabin to the wing structures and round these cables are openings giving direct communication with the cabin and the wings. (3) The fins in the tail of the craft serve to support the caudal structure and the transmission of cables to the tail. (4) The struts which consolidate the wing structures and tails are aerodynamic by means of hoods that might offer refuge to mosquitoes. (5) The petrol tanks are in the wings. On the wings are filters which

are sunk leaving between them and the adjacent part of the wing important hollows by which mosquitoes might enter.

There are a number of other points of the same nature cited in the report, to which reference should be made, which might conceivably harbour mosquitoes. Thus the report shows that there are an astonishing number of spaces, hollows or crevices which by inadvertence might in theory harbour mosquitoes, but it is highly doubtful whether many of the points cited in the report would do so in practice. More likely ones seem to be closed or semi-closed spaces in the interior of the hull and wings.

The report is accompanied by photographs indicating some of the points to which reference is made. M T Morgan

ROBINEAU Instruction récapitulative sur la prophylaxie anti amarille au Sénégal. [Recapitulatory Information concerning Yellow Fever Prophylaxis in Senegal].—*Ann de Méd et de Pharm. Colon.* 1938. Oct.-Nov-Dec. Vol. 38. No 4 pp 914-945 With 2 figs.

A summary of the various measures that have been put into operation in connexion with anti-yellow fever prophylaxis in Senegal including useful administrative details such as lists of the officials responsible for their application in different branches of the service. The article should be consulted in the original by those interested in practical details of this subject in Senegal. E H

BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1938 Nov Vol. 30 No. 11 p 2549—Rapport de la commission de la fièvre jaune. [Report of the Yellow Fever Commission.]

The Commission agrees with the orders for the amelioration of the quarantine conditions for yellow fever in the case of vaccinated persons issued on September 14th 1938 by the Governor-General of French West Africa.

With regard to the duration of immunity after yellow fever vaccination, it is considered that it is too soon to give a definite opinion.

Finally it is stated that from a practical point of view the results of protection tests in domestic animals do not in any way affect the specificity of these tests in man. E H

SMITH (H. H.) PERNA (H. A.) & PAOLIELLO (A.) Yellow Fever Vaccination with Cultured Virus (17D) without Immune Serum.—*Amer J. Trop Med* 1938. Sept. Vol. 18. No. 5 pp 437-468 With 1 chart & 4 figs. [15 refs.]

A detailed account of a year's experience in the production and application of a cultured yellow fever vaccine virus (17D) during which time more than 69,000 persons in Brazil were inoculated with very satisfactory results.

The strain of virus came originally from the Ansb strain, which was established in tissue culture containing mouse embryonic tissue and subsequently in media containing whole fowl embryo. After 58 subcultures in this medium it was then subcultured in one containing

fowl embryo from which the brain and spinal cord had been removed and in this has been maintained for more than 200 passages. Since the titre of virus in these cultures is low the vaccine for human use was prepared from developing fowl embryos inoculated with this culture virus. Eggs with living embryos after about seven days incubation are inoculated above the embryo with 0.06 cc of the culture material and then incubated for three or four days before being taken out for the preparation of vaccine.

The pooled embryos are ground up usually in normal human serum then centrifuged at 3 000 r.p.m. for thirty minutes after which the supernatant fluid containing the virus is cleared through a Buchner funnel with a thin film of asbestos fibre, and subsequently passed through Seitz E K filter discs at 10 lb pressure. This filtrate is put up in ampoules containing 3.0 cc. or in 1.0 cc tubes. It is then frozen in alcohol-carbon-dioxide-snow and desiccated *in vacuo* over sulphuric acid. Each batch is then tested for sterility and also tested for any enhanced or viscerotropic properties or neurotropism by intracerebral inoculation into a rhesus monkey and the quantity of virus in the vaccine determined by tests in mice. Finally the vaccine is stored at 4°C. and always sent to the field packed in ice in thermos containers.

Vaccination consists of the subcutaneous inoculation of the rehydrated vaccine 0.5 cc. being the usual dose though occasionally 1.0 cc was used in the laboratory. The quantity of virus measured in M.L.D. for mouse units, varied from 500 up to 11 000.

Small groups were studied to test the presence of circulating virus and the production of antibodies. Out of 29 men virus was found in the blood of 3 on the fourth day 3 on the fifth 3 on the sixth 2 on the seventh and 1 on the tenth day. It is of interest that 8 out of 12 patients who received more than 5 000 M.L.D. of virus showed circulating virus, as compared with 3 out of 15 who received less than this dose.

Protective antibodies were demonstrated during the first 28 days in the blood of all 29 patients vaccinated. None of 24 tested after 7 days was immune and 9 out of 23 had not developed antibodies after 14 days. As a general rule the titres were low in comparison with those developed by rhesus monkeys or by humans after recovery from clinical yellow fever.

The minimal infective dose of virus necessary for successful vaccination was found to lie between 14 and 140 M.L.D. for mice. 7 out of 10 men receiving only 14 M.L.D. developing satisfactory immunity. The results of studies on more than 1,800 vaccinated persons indicate that approximately 95 per cent of those vaccinated under field conditions acquire immunity. Mouse protection tests on 9 men taken six to seven months and 21 men taken a year after vaccination, showed that protective antibodies were still present. One patient however showed the disappearance of immunity after one year and others a lowered titre indicating a diminution in the quantity of antibodies.

Any reactions to the vaccine were always mild, generally consisting of headache low-grade fever and influenza-like pains. These symptoms as a rule came between the third and eighth days, being most common on the sixth or seventh days and very rarely were severe enough to stop work. No instances of delayed reaction to vaccination have been observed.

E H

PELTIER. L'atténuation des mesures quarantenaires antiamariles en faveur des vaccinés ayant un test de protection fortement positif. [The Amelioration of Quarantine Conditions for Yellow Fever in the Case of Vaccinated Persons giving a Strongly Positive Protection Test.]—*Bull. Office Internat. d'Hyg. Publique* 1938. Nov. Vol. 30 No. 11 pp. 2542-2548.

The regulations in French West Africa concerning the quarantine measures for the control of yellow fever have recently been modified in the case of those giving positive protection tests.

The author gives the results of observations on the results of various serological tests at Dakar during the past four years. With regard to the specificity of the mouse protection test for the examination of human sera, it is pointed out that out of 117 specimens from natives born previously to the Dakar yellow fever epidemic in 1927-71 gave a positive test whilst 100 sera of children born since 1930 were all negative. The results of yellow fever vaccination by Laignret's method of three inoculations of a phosphatic suspension of mouse virus, and the later method of using egg-coated virus are summarized in the following table, which indicates the duration of immunity based on protection tests—

Phosphate vaccine

<i>Period after vaccination</i>	<i>Result of mouse test</i>	
Less than 1 year	Strongly positive	69
	Feebly + or negative	6
1-2 years	Strongly +	30
	Feebly + or negative	10
2-3 years	Strongly +	22
	Feebly + or negative	6
3-4 years	Strongly +	25
	Feebly + or negative	6

Egg vaccine

Less than 1 year	Strongly positive	216
	Feebly + or negative	32
1-2 years	Strongly +	34
	Feebly + or negative	10
More than 2 years	Strongly +	7
	Feebly + or negative	2

It would seem, therefore, that vaccination gives strong protection in at least 85 per cent. of the cases but that it may be advisable to repeat the vaccination every two years. E H

DOBOVAX (Anthony). Organisation de la vaccination antiamarile dans le personnel des compagnies de navigation aérienne et parmi les officiers du service de l'hygiène publique des États-Unis. [The Organization of Anti-Yellow Fever Vaccination in the Personnel of the Aerial Navigation Companies and among Officers of the United States Public Health Service.]—*Bull. Office Internat. d'Hyg. Publique* 1938. Sept. Vol. 30 No. 9 pp. 1887-1894.

An account of the methods adopted by the United States Air Force personnel for vaccination against yellow fever. Details are given of the methods of obtaining and transporting the vaccine and also inoculation technique. The results of 601 vaccinations using a

vaccine prepared at the Rockefeller Institute consisting of virus attenuated by prolonged cultivation in media containing fowl embryo tissue [see this *Bulletin* 1937 Vol. 34 p 690] indicate that 61 per cent of the subjects had no appreciable reaction but 148 showed a rise in temperature accompanied by headache lumbar pains or various complex symptoms. This reaction generally occurred six to eight days after vaccination and only in very exceptional cases lasted for more than 24 hours.

The question of the future supply of the vaccine is raised by the author for it is unlikely that the Rockefeller Foundation will be able to continue its manufacture on a large scale. It is suggested that the National Institute of Hygiene would be the most suitable organization for this purpose. E H

DONOVAN (Anthony) *L'immunisation du personnel des lignes aériennes contre la fièvre jaune* [The Immunization of the Personnel of Air Lines against Yellow Fever]—*Bull. Office Internat. d'Hyg. Publique*. 1938. Sept. Vol. 30 No. 9 pp 1995-1997

A total of 938 vaccinations against yellow fever are recorded up to 1st April, 1938 among the personnel of the Pan American Airways. No serious reaction has ever been observed and only about one in twenty showed any reaction generally about the sixth or seventh day and this only lasted for about 24 hours. However by taking daily temperatures it was found that about a third of the subjects showed a slight rise of temperature, but in the great majority of cases without being accompanied by any subjective symptoms. E H

FINDLAY (G. M.) MACCALLUM (F. O.) & MURGATROYD (F.) *Observations bearing on the Aetiology of Infective Hepatitis (So-called Epidemic Catarrhal Jaundice)*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939 Feb. 28. Vol. 32. No. 5 pp 575-586 [57 refs.]

A valuable summary of recent observations with a critical discussion bringing forward evidence in support of the view that infective hepatitis in man is a virus infection.

Under the name of catarrhal jaundice at least three conditions have been described, one of which is characterized by necrotic changes in the liver and is best termed infective hepatitis. This disease cannot be transmitted with any certainty to experimental animals. The aetiological agent does not seem to be a bacterium, spirochaete or protozoan but may well be a virus since the incubation is long 35 days to 7½ months, and the disease is characterized by a leucopenia, affecting especially the polymorphonuclear leucocytes. In addition it is freely filterable through Seitz EK filters and is not visible under ordinary powers of the microscope.

The infection of a pool of measles immune serum in children resulted in the development of cases of hepatitis and the livers of fatal cases showed necrotic changes. In addition children who came in contact with these patients also developed jaundice indistinguishable from infective hepatitis.

The injection of an attenuated strain of yellow fever virus grown in a medium containing human serum, resulted in 95 cases of hepatitis. The symptoms were similar to those of infective hepatitis and one who

died of pneumonia 12 weeks after inoculation showed hepatitis. The occurrence of jaundice following yellow fever immunization has been traced to the introduction of a filterable hepatotoxic agent in the culture medium, presumably from apparently normal human serum.

It is probable therefore that the condition referred to as post-inoculation jaundice is identical with ordinary infective hepatitis and that the causal agent is a filterable virus. Consequently pools of apparently normal human serum should not be used for human inoculation unless the medical history of all donors can be followed for a considerable period of time and at least one month. [See also JAMES above p. 631 and this *Bulletin* 1939 Vol. 36, p. 30] E H

DA FONSECA (Flavio) & ANTIGAS (Paulo) Recherches sur la sensibilité d'animaux sauvages au virus amaril. [Investigations on the Susceptibility of Wild Animals to Yellow Fever Virus.]—C. R. Soc. Biol. 1938. Vol. 129 No. 34 pp. 1134-1137 [14 refs.]

At the parasitological laboratory of the Butantan Institute the authors have tested the susceptibility to yellow fever of various Brazilian wild mammals, in order to determine whether any species, other than Primates, might harbour the infection. However yellow fever virus was never found in the blood of any of the numerous wild animals tested by intracerebral inoculations into mice.

The peccary *Tajassu tajassu* is very susceptible to the intracerebral inoculation of neurotropic virus, and in this species it can be passaged in series, by using brain material. The blood was negative from the third day and the subcutaneous inoculation of a young peccary gave negative results.

A wild guinea pig *Cavia aperea (rufescens?)* is susceptible to intracerebral inoculation after passage and the virus shows alteration in virulence towards mice.

The capybara, *Hydrochoerus capybara* is very susceptible to intracerebral inoculation, showing the usual symptoms of paralysis. The virus was not present in the blood after the third day and intraperitoneal inoculations of the virus gave negative results.

The opossums, Didelphidae seem to be very little susceptible to infection. In one case virus was recovered from the brain of an animal inoculated intracerebrally 8 days previously, and in another case from one inoculated subcutaneously 9 days before but the virus was not recovered from the blood of 14 animals inoculated.

The coati-mundi, *Nasua nasica* succumbs to intracerebral but not to subcutaneous inoculation.

Takara barbara seems to be susceptible to intracerebral inoculation since it showed paralytic symptoms five days later but its organs are toxic to mice and therefore the presence of virus could not be demonstrated.

One species of armadillo *Cabassous unicinctus* contained virus in its blood 5 days after subcutaneous inoculation of the Anibi strain, but showed no other signs of infection. Another species, *Dasyurus novemcinctus* showed paralysis after intracerebral inoculation, but the virus was not recovered. Other individuals inoculated in various ways with the Anibi strain showed no signs of infection.

The subcutaneous inoculation of the Anibi strain gave negative results with the following animals—*Coenda prehensilis* *Nectomys*

squamipes *Sciurus aestuans* *Hydrochoerus capybara* *Cerdoyon thomazarae* *Didelphis paraguayensis* and *Marmosa* sp

The intraperitoneal inoculation of the same strain also gave negative results with the following —*Sylvilagus mexicanus*, *Bradyptes tridactylus* *Dasyprocta aguti* and *Herpailurus pardinoides*

The intracerebral inoculation of neurotropic virus gave negative results in the following —*Mus musculus musculus* *Epimys norvegicus* *Muridae* spp *Euphrades sexcinctus* *Didelphis paraguayensis* and *Herpailurus pardinoides*

The negative results obtained with the common wild mouse, *Mus musculus musculus* indicate the existence in this species as in the case of white mice of races varying in their susceptibility to infection with yellow fever since wild mice in other parts of the world have been found to be susceptible

E H

DA FONSECA (Flavio) & ARTIGAS (Paulo) Sensibilité du chat au virus amaril neurotrope. [The Susceptibility of the Cat to Neurotropic Yellow Fever Virus.]—*C R Soc Biol* 1938. Vol. 129 No. 34 pp. 1143-1145

Young cats two to three months old, were found to be susceptible to infection with neurotropic yellow fever virus when inoculated intracerebrally. The animals showed paralysis and the infection was passed from one cat to another and also to mice. Virus was not found in the circulation even on the third day. Young cats inoculated in various ways with the Ansb strain showed no signs of infection.

The positive results obtained by intracerebral inoculation differ from negative results obtained in Europe and indicate that cats show considerable variation in their susceptibility to infection with the neurotropic yellow fever virus.

E H

DA FONSECA (Flavio) L'hypersensibilité d'un rongeur brésilien au virus amaril neurotrope [The Hyper-Susceptibility of a Brazilian Rodent to Neurotropic Yellow Fever Virus.]—*C R Soc Biol* 1938 Vol. 129 No. 34 pp 1132-1134

A small rodent *Ctenomys brasiliensis* Blainville belonging to the family Octodontidae, has been found by the author to be very susceptible to infection with neurotropic yellow fever virus. Only two specimens were obtained. The first was inoculated intracerebrally with a small dose of virus and showed paralytic symptoms 12 days later. Emulsions of blood, liver and brain were subinoculated intracerebrally into mice. The blood was negative. One out of six mice inoculated with liver material became infected. Of three inoculated with brain material one died on the fourth day and the other two became ill on the ninth day. One of these recovered and the other was used for further passages in mice, in which it regularly produced death in four to five days. Similar results were obtained with the second specimen of *Ctenomys*. The examination of the liver of this animal showed only fatty degeneration without the typical necrosis therefore this species does not seem to be as susceptible as the hedgehog

E H

as in Bas-Congo has only had slight local repercussions. The number of inhabitants was 1 167 175 and of these 1 156 741 were examined. New cases found during the year were 4 475 (0.4 per cent). The number of old patients on 1st January 1936 was 10 655 of which 4,065 were in the recently occupied sub-sectors of Kwango. The number of patients resuming treatment was 2,348 and the total number treated during the year was 17 488. The number of cases cured was 9,368 (53.7 per cent) 425 disappeared and 396 (2.26 per cent.) died the number remaining on treatment was 7,270. These figures give a general idea of the anti trypanosomiasis activity of Foréami during 1936. Much further information is given regarding the state of the disease and the measures taken to combat it in different portions of Bas-Congo and Kwango but for details the original article must be consulted.

The standard treatment administered consisted in a preliminary injection of germanin (moranyl) 1 gm. followed by 12 or 14 injections of trypanaryl. Interesting information is given regarding the control of treatment by lumbar puncture. This was found to be quite practicable in ambulatory treatment and was not attended by any serious accidents. In all, 63,818 punctures were made 3,321 in Bas-Congo and 55,588 in Kwango. The number of punctures performed for diagnosis were 5,398 of these 4,249 were cases proved by the discovery of the trypanosomes in blood or gland juice and 1 149 were clinically suspected cases. No less than 93 to 95 per cent of the definitely diagnosed cases were punctured. The cell count in the spinal fluid of these cases is shown in the following table. The concordance of the results obtained in the two sectors is remarkable —

	0-5	5-10	10-50	50-100	100 and over
Bas-Congo	294 54.9%	111 20.7%	88 16%	12 2.2%	33 6.1%
Kwango	2,005 54%	655 17.6%	647 17.4%	150 4%	258 6.9%

The results of puncture in the suspected cases gave 25.1 per cent of changes (289 out of 1 149). In the Bas-Congo the figures were 16.1 per cent as against 32.9 per cent. in 1935. Details of various districts are given in a table.

The punctures of elimination totalled 8,840—879 in Bas-Congo and 9 161 in Kwango and the punctures of control totalled 40,863 of these 3,698 were done in Bas-Congo and 37,264 in Kwango. Further details of these are also given. This section of the report must also be consulted in the original by those interested. *IV Yorks.*

CONGO BELGE FONDUS REINE ELIZABETH POUR L'ASSISTANCE
MÉDICALE AUX INDIGÈNES DU CONGO BELGE. RAPPORT ANNUEL
1937 pp 32-48 With 1 map A—Maladie du sommeil.
[Sleeping Sickness.]

Sleeping sickness has always occupied the first place in the nosology of the regions under the care of Foréami. Although it is practically

non-existent in certain districts it is a constant menace where the vectors are numerous. In certain districts particularly Moven-Wamba Bas-Kwango and Bas-Kwila it is however present to such extent that the organization has to devote almost all its activity to an anti trypanosomiasis campaign.

Particular attention has always been given by the Foréam personnel to the subject of diagnosis. Gland palpation should always be performed by the European who thus gains an approximate idea of the end-mucity of the disease in the locality. The examination of the gland juice is made by native microscopists but their work is constantly supervised by the doctor or sanitary agent. Examination of fresh and thick blood preparations and the triple centrifugation method are also done by native specialists. Other methods of examination are undertaken by the doctors or more rarely by sanitary agents. It is claimed that this distribution of work assures efficiency and leaves the doctors sufficient leisure for more specialized work.

Two arsenic resistant strains have been isolated, one came from an old focus at Chenal and the other from Lukula where arsenic resistance has not hitherto been recognized. The latter strain which was of moderate resistance proved of extreme virulence for laboratory animals and is being examined by van Hoof. Other sporadic cases have been notified by doctors but in the absence of more detailed study it is impossible to be certain that these were cases of true arsenic resistance.

An attempt has been made to ascertain the frequency of visual disturbance following treatment by arsenicals and to determine whether these accidents were related to the age and sex of the patients. Observations made on 1 893 patients treated with trypanarsyl gave the following results—

- 1 Males were more subject to visual disturbance than females but the proportion of definite blindness was the same in both sexes.
- 2 The proportion of definite blindness was less than 1 per cent.
- 3 The frequency of accidents increased with the age of the patient.
- 4 Accidents were most common at the commencement of the course of treatment.

Treatment is always prescribed by sanitary agents and is administered at rural dispensaries by certificated natives. The courses of treatment have hardly been modified and the general directions are given by doctors. As a general rule since diagnosis is made early the courses can be standardized. Unfortunately medical supervision of very extensive thinly populated regions has hitherto not allowed of systematic control of treatment but the more intensive assistance now adopted will permit of this. European supervision is now concerned more with the regularity of the courses of treatment than with the technique of administering them. The efficacy of treatment is controlled by systematic re-examination of the patients during two years.

Although the phyto-geographical conditions—forests traversing plateaux more or less bare—may be identical in the whole extent of a sector the disease is not uniformly distributed. The cause of this is discussed at some length. High endemicity is manifestly due to the nature of the occupation of the natives and to their habits. Large clearings or the agglomeration of the people rapidly produce a fall in the index of new cases. The endemicity is also maintained by the

continuous introduction of exogenous virus or by the insubordination of the natives who refuse re-examination. Migrations also play a part. But besides these factors there are others less well known which influence the endemicity of the disease. Medical action alone cannot explain the extremely rapid retrogressions which are sometimes noticed in certain districts similar or even better work in neighbouring districts being followed by much poorer results. Possibly in districts where the disease has existed for a long time the individuals develop a certain degree of immunity and Vax Hoor has shown that a virus tends to lose its transmissibility after repeated passages through the same vertebrate host.

In the area controlled by Foréami the endemicity of sleeping sickness develops favourably. In recent foci the regression is rapid, but it is slower and less regular in old foci, and sometimes also in regions previously very heavily infected and in places where new strains are being constantly introduced. As a result of the prophylactic work the number of new cases discovered in 1937 declined by more than 1 000. It is expected that this important regression will be maintained in future years and will be especially evident in Moyen-Wamba where the epidemic is still in full force. In Bas-Kwango substantial progress has already been realized. In Bas-Kwila and in Chenal, which are very old and active foci, the improvement so evident in 1938 was less marked in 1937 but will probably be resumed. In all the remaining sub-sectors the situation is very favourable.

The nutrition of the population is an important factor in the success of an anti-sleeping sickness campaign. Figures are given in support of this contention. The report ends with details of the results of examination of the population and of the treatment of the infected in the various parts of the region controlled by Foréami. W Y

BRAZZAVILLE AFRIQUE ÉQUATORIALE FRANÇAISE RAPPORT SUR LE FONCTIONNEMENT DE L'INSTITUT PASTEUR DE BRAZZAVILLE PENDANT L'ANNÉE 1937 (SALEUX (G)) pp 74-100—Service de la surveillance de la maladie du sommeil. [Sleeping Sickness Service.]

During the year 1937 9 Europeans were found to be infected with trypanosomes. Of these 9 who were treated at Brazzaville only 3 were diagnosed at the Brazzaville Institute the remaining 6 being discovered in various parts of the Colony. Besides these 9 cases, a few others were diagnosed and treated in the Colony and sent straight home without visiting Brazzaville. Clinical details are given regarding each of the 9 cases dealt with at Brazzaville.

Among the natives 148 new cases of sleeping sickness were dealt with at Brazzaville as compared with 239 during the previous year. But this does not necessarily imply that the disease is decreasing. The 148 cases are made up as follows—discovered by itinerant missions 50 sent by dispensaries 46 sent by hospitals 17 came themselves 35. Attention is drawn to the fact that in 1936 29 197 persons were examined by the itinerant missions and 239 cases discovered (0.81 per cent) whilst in 1937 8,216 persons were examined and 50 cases discovered (0.61 per cent.) In a table details are given regarding the regions in which these cases were discovered the index of infection was small, except in Coulair where it was 2.2 per cent.

Emphasizing the importance of early diagnosis the report gives information regarding the means by which the trypanosomes were found and a diagnosis made. In 10 cases trypanosomes were found only in the gland juice in 5 cases diagnosis was made by examination of thick blood films the triple centrifugation method being negative in 6 cases triple centrifugation was positive but thick blood films negative in 70 cases both triple centrifugation and thick films were positive and in 32 diagnosis was made by lumbar puncture both blood and glands being negative.

Clearly then it is not uncommon to find that in the nervous period the glands have shrunk and the parasites have disappeared from the peripheral circulation but they multiply readily in the central nervous system. In this stage the clinical signs are not always obvious and it is necessary to interrogate the patient closely. These results show that the various methods of examination of the patient for trypanosomes are complementary to one another and must often be practised simultaneously, lumbar puncture being reserved for those in whom trypanosomes are found and for suspects i.e. persons with glands without parasites and with suspicious signs or history.

Information is given regarding the stage of the disease in the new cases at the time of their discovery and of their treatment and some details are recorded of old patients who died during the year. The general conclusion reached is that the problem of sleeping sickness has not changed the measures for dealing with it remain the same, and there does not seem to be any necessity to modify them. IV }

GEAR (J. H. S.) & DE MEILLOU (B.) Laboratory Investigations of Two Cases of Trypanosomiasis contracted in Ngamiland, Bechuanaland.—*South African Med J* 1939 Apr 8. Vol. 13 No 7 pp 233-236

Details are given of two cases of sleeping sickness contracted in Ngamiland Bechuanaland. Investigation showed the trypanosome to be *T. rhodesiense*. The fly responsible was *G. morsitans*. The authors state that the discovery of these cases reveals an endemic focus of the disease in an area further south than any hitherto reported.

IV }

BRODERICK (M. J.) & PIJPER (Adrianus) A Case of Sleeping Sickness from Bechuanaland.—*South African Med J* 1939 Feb 23. Vol. 13 No 4 pp 127-128. With 2 figs.

Clinical details are given of a case of trypanosomiasis contracted in the neighbourhood of Maun in Bechuanaland. There is nothing of importance about the case except the locality in which it was contracted.

IV Y

SWARTZWELDER (J. Clyde) Consideration of the Classification of Trypanosomes, with Special Reference to the Classification of Jaco.—*Jl Trop Med & Hyg* 1938. June 1 Vol. 41 No 11 pp 182-187 With 3 figs.

In this paper the author undertakes to explain and clarify the proposed new classification of trypanosomes which has been propounded in a number of Italian publications by JACOVO. It is perhaps significant

that he is careful to state that he has done this without presenting his personal viewpoint. This article in English will be a convenience to those who are unable to read the original papers of the author of the new scheme.

C. M. Wesson.

HAWKING (Frank) A Quantitative Study of the Photosensitivity Induced in Trypanosomes by Acriflavine.—*Ann Trop Med & Parasit* 1938 Dec 21 Vol 32 No 4 pp 367-381 With 4 fig.

JANCsó showed that when trypanosomes have absorbed acriflavine they become photosensitive in that they soon became motionless and presumably dead when exposed to strong light on the stage of a dark ground illumination microscope. In the present paper Hawking describes a quantitative investigation of Jancsó's technique so that it can be used to measure the quantity of acriflavine in the trypanosomes or in the medium with which they are in contact.

The following is the summary of this somewhat technical paper —

1. When trypanosomes are exposed to acriflavine *in vitro* or *in vivo* they become photosensitive owing to their absorption of the compound. The degree of photosensitivity can be measured quantitatively on the stage of a dark-ground microscope as the period of illumination required to cause immobilization.

2. Equations are given for (1) the relation between the photosensitivity and the initial concentration of acriflavine in the medium, and for (2) the relation between the photosensitivity and the acriflavine-content of the trypanosomes. These equations enable the photo-sensitivity to be used to measure low concentrations of acriflavine (0.2-0.6 μ l. per ml.) or to indicate the acriflavine-content of small numbers of trypanosomes. The accuracy is about 50 per cent.

3. The resistant strain of trypanosomes shows a smaller range of individual variation than the normal one: the coefficient of variation in the resistant strain being 22 per cent. and in the normal strain 33 per cent.

II 1

BROOM (J. C.) & BROWN (H. C.) Studies in Trypanosomiasis. III.—The Electric Charge of Trypanosomes in the Salivary Glands of Tsetse Flies.—*Trans Roy Soc Trop Med & Hyg* 1939 Jan 28 Vol 32 No 4 pp 545-548.

In a previous paper [this *Bulletin* 1937 Vol 34 p. 930] the authors have shown that the electric charge of the developmental forms of *T. brucei* in the gut of *G. morsitans* is invariably negative irrespective of the sign of the charge of the trypanosomes in the animal host on which the fly was fed. As the strain with which they were then working proved to be incapable of complete development in the fly the authors were unable to study the electric charge of the trypanosome throughout its entire cycle. They have however now been able to complete their observations on a new transmissible strain of *T. brucei*.

It has been proved that, when positively charged trypanosomes are ingested by a tsetse, one reversal of the sign of the charge takes place in the gut of the fly, and a second reversal in the salivary gland. With negatively charged trypanosomes the only reversal occurs in the salivary gland. In both instances the blood trypanosomes of rats infected by the fly are predominantly positively charged. II Y

JERACE (Felice) Sulla morfologia della *Castellanella brucei* [Morphology of *Trypanosoma brucei*].—*Ann d'Igiene* 1938. Sept.-Oct Vol 48. No 9-10 pp 553-559 With 1 text fig & 12 figs on 2 plates

A strain of *Trypanosoma brucei* (referred to as *Castellanella brucei*) has been studied in various laboratory animals. It is concluded that the trypanosome exhibits an extreme polymorphism but this is based largely on observations on what are undoubtedly degenerating forms which cannot in any way be regarded as occupying a place in the normal morphology of the flagellate
C M Wenyon

HOARE (C A) & BROOM (J C.) Morphological and Taxonomic Studies on Mammalian Trypanosomes VII.—Differentiation of *Trypanosoma uniforme* and *T vivax* in Mixed Infections.—*Trans Roy Soc Trop Med & Hyg* 1939 Feb 28 Vol 32. No 5 pp 629-632. With 1 fig

In a previous paper [this *Bulletin* 1938 Vol. 35 p 701] the authors have shown that *T uniforme* and *T vivax* can be distinguished by differences in the mean and range of their lengths and that the measurement of the length of 10 individuals selected at random in any strain is sufficient for the identification of the species to which the trypanosome belongs

The correctness of this method was verified in the case of some strains of these trypanosomes preparations of which were sent to the authors by VAN HOOFF from the Belgian Congo. In all these cases the authors were dealing with pure infections, and until recently they have not had an opportunity of testing the statistical methods in mixed infections with the two species. Since the two trypanosomes differ only in length the identification of such infections by simple inspection is unreliable and inconclusive. This has been the experience of other observers and the authors encountered the same difficulty in the case of blood films from a situtunga received from CARMTCHAEI of Entebbe. The majority of the trypanosomes were small and conformed to the appearance of *T uniforme* but some were longer and were apparently *T vivax*.

In a table and histogram the frequency in distribution of 100 trypanosomes in respect of length is shown from which it appears that *T uniforme* contributed 82 per cent. of the infection and *T vivax* 18 per cent. That it was possible to differentiate the trypanosomes in a double infection affords further evidence of the independence of the two species of the *vivax* group

The authors emphasize that the only practical method for determining mixed infections with these trypanosomes is that based on a minimum of 100 measurements.
W Y

I. CRISTIANI (Michelangelo) Infezioni da tripanosomi e spirochete per via auricolare Ricerche sperimentali. [Experimental Infections with Trypanosomes and Spirochaetes by the Auricular Route].—*Arch Ital Sci Med Colon e Parassiti* 1938 July Vol 19 No 7 pp 406-415 [14 refs.]

ii. — Sulla permeabilità della mucosa nasale per alcuni protozoi (trpanosomi spirochete, sparelle) [Permeability of the Nasal Mucosa for Trypanosomes and Spirochaetes].—*Ibid* pp 416-429 [40 refs.]

i. The first paper describes experiments wherein the author has succeeded in infecting guinea-pigs and mice with various pathogenic

trypanosomes and relapsing fever and rat bite fever spirochaetes by introducing infective material into the external auditory meatus. The infections thus produced differed little from those resulting from subcutaneous inoculations.

ii In the second paper similar experiments carried out on the nasal mucosa are recorded. Both trypanosomes and relapsing fever spirochaetes are able to pass through the intact mucous membrane of the nose [see also this *Bulletin* 1939 Vol. 38 p. 111].

C. M. Wesson

CORSON (J. F.) A Fifth Note on the Infectivity to Man of a Strain of *Trypanosoma rhodesiense* Three Further Passages through Antelopes and Tests on Man Two Charts of the Whole Experiment.—*Jl Trop Med & Hyg* 1939 Jan. 2 Vol. 42 No. 1 pp. 5-7

The preceding note [this *Bulletin* 1939 Vol. 38 p. 208] carried the record of this experiment to March and April, 1938. In the present paper three further transmissions by *Glossina morsitans* through antelopes each followed by infection of a volunteer are recorded and two charts are given showing the passages and tests on man from the beginning of the experiment in October 1934 to October 1938 when the strain was still infective to man. Corson concludes his paper with the following comment —

As I have said in previous papers, in my opinion only positive results should be taken into consideration regarding the infectivity to man of this strain of *T. rhodesiense*. Because some volunteers resisted infection it cannot be inferred that the infectivity of the strain to man has become less during maintenance in ruminants and *Glossina morsitans* for four years. It seems that it must be very difficult to demonstrate a decrease of infectivity to man, and practically impossible to prove that a strain has lost its infectivity to man.

W. J.

BROOM (J. C.) The Maintenance of *Glossina morsitans* in England for Experimental Work.—*Trans Roy Soc. Trop Med & Hyg* 1939 Feb. 28 Vol. 32 No. 5 pp. 633-638. With 1 chart.

The data presented in this note were accumulated in the course of a study of the developmental cycle of *T. brucei* in *G. morsitans*. The method which proved most satisfactory for the maintenance of the tsetse in Britain is briefly as follows —

Pupae of *G. morsitans* were received by air mail from Tanganyika in batches of about 2000 at fortnightly intervals. The pupae were enclosed in a bag of mosquito netting which was placed in a wooden box with six holes $\frac{1}{2}$ in. in diameter bored in each face of the box to ensure a supply of fresh air during the five days' journey. A certain number of flies always hatched out on the journey but most of them were dead on arrival.

Pupae were distributed in two or three glass jars, 4 in. deep and 4 in. wide, the tops of the jars being covered with mosquito netting. Each jar was stood in an 11 in. Petri dish containing a saturated solution of common salt to maintain a humidity of 80 per cent. saturation the whole was covered with a large bell-jar and kept at a temperature of approximately 24°C. The great majority of the flies

were hatched in an insectarium lighted by daylight, but it was found by experiment that artificial light is equally effective in causing development of the wings. From the 58 000 pupae received about 13,500 flies emerged, i.e., approximately 23 per cent.

The flies were collected every 2nd day and placed 4 or 5 together in glass tubes 4 in. by $\frac{3}{4}$ in. one end of which was covered with mosquito netting and the other end closed with a cork. These tubes were applied to infected rats and the flies given an opportunity to feed. The fed flies were then separated and placed, in tens in glass cylinders 4 in. by 2 $\frac{1}{2}$ in. the ends of which were covered with mosquito netting. Each cylinder thus contained flies all known to have had an infective feed on the same day. The unfed flies were returned to the small tubes and given a further opportunity to feed.

The complete developmental cycle of the strain of *T. brucei* used in these experiments occupied at least 25 days. During the first three weeks after the infective feed the flies were therefore fed thrice a week on clean guinea-pigs thereafter they were fed at the same intervals on chickens. The cylinders containing the fed flies were kept at a constant temperature of 24 to 25°C in a humidity of about 80 per cent saturation.

The survival of a population of 10 000 *G. morsitans* during the first five weeks of life after the infective feed is shown in a table. On the 10th day there were 7,532 flies alive on the 20th day 5,575 on the 30th day 4 038 and on the 30th day 3 423. The same data are set forth graphically in curves one curve showing the survival of the flies kept under better conditions and the other the survival of those kept under worse conditions. The difference in the relative number surviving was found to be marked throughout whereas fully one-third of the flies lived for 5 weeks under the better conditions less than one-tenth reached that age in the other case. W Y

SICÉ (A.) & TORRÉST (F) Considerations sur l'épidémiologie l'évolution clinique et la prophylaxie de la trypanosomase humaine au Soudan Français [Notes on the Epidemiology Clinical Evolution and Prophylaxis of Human Trypanosomiasis in the French Sudan.]—*Bull Soc Path Exot* 1939 Jan. 11 Vol 32. No 1 pp 88-93

The climatic conditions of the French Sudan are responsible for certain epidemiological characters which are not met with in the sleeping sickness of French Equatorial Africa.

The pathogenic agent is *T. gambiense* but sometimes trypanosomes were found in the blood or spinal fluid of patients which when introduced into guinea-pigs exhibited a polymorphism recalling that of *T. rhodesiense*. The tsetse found were *G. tachinoides*, *G. palpalis* and *G. morsitans* in the valleys of the black Volta and of the Bani the predominant species in the dry season is *G. tachinoides*. Numerous authors have drawn attention to the influence of atmospheric conditions—vapour tension and temperature—on the biology of *Glossina* in different countries. This influence is very apparent in French Sudan.

Details are given in a table of the atmospheric humidity and temperature during the months of the dry season viz. December to April, and also during the wet season, June to August. The variations in the atmospheric conditions and their influence on the density of

Glossina and on the relative number of the different species confirm the findings of NASH BURTON and LLOYD in Northern Nigeria. [See also this *Bulletin* 1934 Vol 31 p 216 1935 Vol 32 pp 369 723 1937 Vol 34 pp 533 109-111] IV 3

SICÉ (A) & TORRÉSI (F) *Considérations sur l'épidémiologie et la prophylaxie de la trypanosomiose humaine au Soudan français. [Considerations on the Epidemiology and Prophylaxis of Sleeping Sickness in the French Sudan.]—Bull Soc Path Exot.* 1939 Feb 8 Vol 32 No 2 pp 154-156

The fight against *Glossina* in the Sudan does not appear to be any easier than in other countries. Although their permanent haunts are more circumscribed than in Equatorial Africa, and the more severe climatic conditions compel the insects during 4 or 5 months of the year to take shelter in their permanent haunts, one is faced with the same difficulties in the Sudan as elsewhere. Certain individual flies ensure the survival of the species from one favourable season to the next: a relatively large number of females survive and the pupae are resistant to unfavourable climatic conditions.

The authors discuss the methods which they found most useful for destroying the insects and their pupae and emphasize that such methods as clearing of hush must be carried out under skilled direction.

IV 3

MOPEAU (R. E.) *Climatic Classification from the Standpoint of East African Biology—Jl. Ecology* 1938 Vol 28 pp 467-501

Faunal zones are associated with vegetational formations limited by climate. Though the eco-climate is ultimately fundamental it may increasingly be deduced from standard climate. Climatic maps for East Africa have yet to be made. Characteristics of the area are complicated relief, slight annual but high daily range of temperature, rarity of frost at least in screens, and marked droughts in which most of the soil moisture is lost in the first month, causing relatively insignificant loss in the later intensely dry months of biological rest.

Köppen's climate classification groups together in East Africa cultivated areas and those where agriculture is impossible and Scaetta's modification for Ruanda is of too local application. Generally seasonal incidence of rainfall is accorded too little weight and this may be true also of Meyer's rainfall-saturation deficit ratio. Evaporation data are here too scanty to be used.

Rainfall-temperature relations have been employed, but high temperature does not necessarily indicate dryness. Thus Lang's division of mean temperature into total rainfall takes no account of dry periods and De Martonne's similar index, where however 10 is added to the mean temperature, gives too low thresholds for both "dry farming" and forests in East Africa. Emberger divides total rainfall by a function of median temperature combined with extreme range because high range may indicate dryness, but the validity of a function twice introducing minimum temperature which is less important than dew point, is doubtful.

Crowther's "leaching factor" is founded on too local data, and Andrews and Mearns though allowing for dry months ignore residual effects of rainfall, so that parts of East Africa on their system appear too "dry."

Generally extremes are more important than climatic means especially where rainfall is low or sharply seasonal. Use of median instead of mean temperature or the application of the standard deviation as a measure of variability is objectionable because very low is probably more important biologically than very high rainfall and altered distribution with unchanged total fall affects desiccation and effectiveness is also governed by interception and run-off and this in turn by the nature of the soil. Mist and cloud by affording shade and causing horizontal precipitation often permit the occurrence of forest where rainfall is low.

Mean annual temperature in East Africa is determined by altitude excepting local variations near the sea and Lake Victoria. Except where local topography plays its part the tropical zone extends up to 4000 ft and the highland zone from 6000 ft above the mean temperature isotherm of 18 C. Between lies an intermediate zone. Rainfall below 40 mm in a month is probably ineffective and when a month over 40 mm occurs in a long dry period it should be discounted.

In default of evaporation data the best available classification for East Africa is one based on some function of temperature combined with the length of the wet season and the total rainfall in that season. But such a system will still be defective because it takes no account of climatic extremes horizontal precipitation caused by mist and rainfall effectiveness governed by the total fall and by the nature of the soil.

[It seems that in default of evaporation data more work should be done to elucidate the relation of evaporation to saturation deficit which may prove to be simple. Failing this Emberger's system may receive more consideration since though range of temperature may be biologically insignificant the dryness which it indicates is not. Further extreme dryness may well be a concomitant of very long dry periods which therefore on such a system are not entirely ignored.]

A comprehensive bibliography is an extremely useful feature of this paper.]

C H N Jackson

DAVE (J Burt) The Classification of Tropical Woody Vegetation-Types.—Imperial Forestry Institute University of Oxford. Institute Paper No 13 pp 1+85 1938 [2s 6d]

This paper is the work of a forest botanist who wishes to standardize the classification of types of tropical woodland. The problem of naming and defining such things as savannah orchard-bush miombo and kurumi is familiar to those entomologists who work on Glossina. The present work will help to keep them in line with what the botanists are doing.

The author stresses the need for a common terminology and a common range of observations in the description of plant communities. Nomenclature such as that of Clements for successional stages is rejected pending further knowledge but a distinction is made between temporary disturbance (cultivation etc.) and long term trends.

For primary classification Schumper's arrangement based on aerial factors is preferable to Warming's which was based on edaphic factors i.e. differences in type of soil. A useful tabular comparison of Chipp's and Champion's modifications is given.

The plant association "is defined as the largest unit of a definite assemblage of species the formation as a group of associations with both a common physiognomy and a common aerial habitat. A formation type is a group of formations with a common physiognomy. In the summary however these definitions are not sustained. The formation is there stated to be of two kinds namely climatic, governed by aerial factors, and edaphic governed by soil and drainage. The first covers large areas and the second is of purely local occurrence and of different physiognomic form. Further the formation is sometimes defined as necessarily a climax and elsewhere (climatic formation) as not necessarily a climax. The edaphic formation is regarded as possibly a sub-formation only since it may be only a part of the climatic formation. It is not clear from this why the edaphic formation or sub-formation should not be regarded as an association.

The body of the paper consists of a description of 17 tropical formations divided into the formation types of moist and dry woodland grassland and desert, with many sub-formations. There appears to be nothing to cover the unique deciduous scrub climax of East Africa, dominated by a closed woody thicket association from which grass is absent.

Besides a bibliography and a skeleton glossary there is a list of data to be recorded in the field to provide mainly qualitative answers to more than 150 questions. For the benefit of those foresters unable to deal with all these the questionnaire is divided into three parts —

1 Synecology includes qualitative and quantitative composition of the community its physiognomy phenology and biotic (actually zoological) relations. The biotic questions refer only to termites and to bird and other animal distributors of fruits and seeds it seems that the grazing trampling and marring caused by the ungulates and other animals might recommend their consideration.

2 Autecology covers specific dimensions and morphology phenology and regeneration.

3 Under habitat are included the physical factors, both climate and soil, and biotic features, all but one of these last questions relating to some form of human interference.

C H N Jackson

PIRELLA (Giuseppe) I fenomeni immunitari nelle tripanosomiasi. Studio monografico. [Immunity in Trypanosomiasis.]—*Rendiconti Istituto di Scienze Pubbliche* Roma. 1938. Vol. 1 Pt. 3 pp. 931-1078 [459 refs.]

RADNA (R.) La microscopie de fluorescence comme mode de recherche du bacille de la Lèpre et des trypanosomes. [Fluorescent Microscopy as a Method of Examination for the Leprosy Bacillus and Trypanosomes.]—*Ann Soc Belges de Méd. Trop.* 1938. Dec. 31 Vol. 18. No. 4 pp. 623-628. [11 refs.]

REICHERT in 1911 constructed a fluorescence microscope but the illumination was so poor that it would not allow of high magnifications. Later however this difficulty was overcome. The organisms are treated with fluorescent reagents, e.g. in the case of trypanosomes—trypanflavine, 2-p-acetylaminostryryl 6-dimethylaminoquinolin methosulphate, or coryphosphine. The author claims that this method facilitates the search for trypanosomes in the blood.

W Y

FOURNIALS. Des erreurs de diagnostic en matière de trypanosomiase [Errors of Diagnosis in Trypanosomiasis].—*Rev Prat Malad des Pays Chauds* 1938 Sept. 17th Year Vol. 18. No 9 pp 412 415-16 419-20 422-3

In this note the author discusses the reasons for failure to reach a correct diagnosis in human trypanosomiasis. He illustrates his points by brief clinical summaries of 23 cases. The article which contains nothing new must be consulted in the original by those interested.

W 1

CORSON (J F) A Record of Some Complications which occurred in the Course of Experimental Infections of African Volunteers with *Trypanosoma rhodesiense*.—*Ann Trop Med & Parasit* 1938 Dec 21 Vol. 32. No 4 pp 437-443

In this paper the author records a somewhat high incidence of complications which occurred in the course of experimental exposure to *T. rhodesiense* infection of 43 African volunteers during 1937 and 1938 of these 28 became infected and 15 resisted infection. Each volunteer except Nos. 8 9 and 10 was exposed to infection by the bite of a single infective *Glossina morsitans*. All were treated, whether infected or not and germanin alone was used, in 1 gm. doses given intravenously. A number of notes are given regarding each of the 43 cases.

Corson states that there is no reason to think that either the infection with trypanosomes or the treatment with germanin had anything to do with the complications except with the albuminuria. The more serious complications fortunately occurred after the third or fourth dose of germanin, so that the infection with trypanosomes could be regarded as cured before the complication appeared.

W 1

PENARD (BL) BRUMPT (L.) & RAYMONDEAU (BL) Présentation d'un malade atteint de trypanosomose révélée tardivement par des convulsions et du prurit. [A Case of Trypanosomiasis Diagnosed Late by Convulsions and Pruritus].—*Bull et Mém. Soc Méd Hôpît de Paris* 1939 Mar 6 55th Year 3rd Ser No. 7 pp 324-327

The patient a native 32 years of age was sent to hospital suffering from epileptic convulsions and pruritus. A diagnosis of nervous syphilis was made and a lumbar puncture performed. The fluid gave a positive Wassermann reaction but the authors were impressed by the excess of protein and especially by the cell count of 1,800 per cmm. On centrifuging trypanosomes were found, and also malarial and other abnormal cells. Examination of blood and bone-marrow was negative the glands were not puncturable.

W 1

REYNES (V) & TRINGUIER (E.) Réflexions à propos de quelques résultats de traitement de la trypanosomiase humaine dans un centre de brousse [Reflections on Some Results of Treatment of Sleeping Sickness in the Bush].—*Bull Soc Path Exot* 1938. Dec. 14 Vol. 31 No. 10 pp. 955-968. [17 refs.]

In this article the authors review the results obtained by them in the treatment of sleeping sickness at one of the districts (Tibati) in the Cameroons where the patients have been observed closely for

dispensaries and those who came up regularly for treatment. All cases were diagnosed in June and July 1937 and were under observation up to July and August 1938.

Group 1 A.—Cases with peripheral infection of the 22 cases treated with tartar emetic-trypanoxyl and kept under observation for the full period, all were apparently well without signs of infection.

B.—Cases with nervous involvement of 32 with meningeal reaction and treated with tartar emetic trypanamide 30 (94 per cent.) were well, with normal spinal fluids and without signs of infection and 2 (6 per cent.) had trypanosomes in the blood. Of 37 meningo-encephalitic cases treated in the same way 5 had died and 6 had disappeared. 18 of the remaining 28 exhibited no signs of disease and 8 remained in *status quo* or were worse.

Group 2 A.—Cases with peripheral infection of the 41 patients treated with tartar emetic trypanoxyl and kept under observation for the full period, all were cured.

B.—Cases with nervous involvement of the 90 patients with meningeal reaction 63 (70 per cent.) were apparently cured, 14 (15.55 per cent.) showed an increase of cells in the spinal fluid, but no increase of protein, 13 (14.44 per cent.) had got worse. Of the 97 patients with meningo-encephalitis 68 were kept under observation and 11 (11.33 per cent.) had died, 37 (54.41 per cent.) were apparently normal and 31 (45.88 per cent.) were either no better or worse.

The authors conclude from this work that synergic treatment gives excellent results. The best mixture is moranyl and trypanamide, but the combinations tartar emetic trypanoxyl or tartar emetic-orsanine are also valuable.

IV Y

ROUSSEAU (G) Quelques essais de traitement de trypanosés chroniques par le mélange anthiomaline-moranyl. [Attempts at the Treatment of Chronic Trypanosomiasis with Anthiomaline-Moranyl Mixture].—*Ann. Soc. Belge de Méd. Trop.* 1939 Mar 31 Vol. 19 No. 1 pp 73-80

The firm of Specia provided the author with two powders (A) consisting of moranyl 10 gm.+anthiomaline 0.6 gm. and (B) of moranyl 10 gm.+anthiomaline 1.8 gm.

Powder B can be injected into man in doses of 0.25 to 0.5 gm., and probably even of 1 gm. without trouble. Powder A can be given in doses of 1 gm. or more without danger. Details are given concerning 8 advanced cases treated by these mixtures. The injections were made at intervals of 4 days until 10 had been given. They caused no trouble apart from the fact that some of the patients developed albuminuria after the 4th or 5th injections. Some of the cases appear to have been improved others not.

IV Y

ASTRACHAN (Girsch) & FRANKS (Andrew G) Nitritoid Reaction following an Injection of Trypanamide.—*Arch. Dermat. & Syph.* 1938 Dec Vol 38, No 6, pp. 949-950

Details are given of a case of cerebrospinal syphilis exhibiting nitritoid reactions after injection of trypanamide. The patient had previously received ninety injections of trypanamide (1 to 2.5 gm.) without any ill effect and had also tolerated injections of neocarsphenamine and a bismuth preparation. On February 11th, 1937 she

stated that she felt nauseated for a while and noticed a mild swelling and redness of the face which lasted a few minutes after the previous week's injection of 2 gm of tryparsamide. In view of this, the dose was reduced to 1 gm. and the patient was carefully observed while the injection was being given. Immediately after the injection she complained of a tickling sensation in the throat and nausea and pain in the stomach. Three minutes later the conjunctivae became suffused and a diffuse redness spread over the face and neck. Intense coughing followed and the patient complained of a choking sensation in the throat, heaviness in the chest, a feeling of swelling of the face and a burning sensation in the eyes. All these symptoms disappeared in fifteen minutes.

Tryparsamide was then discontinued but renewed seven months later after a prophylactic course of liver extract. Injections of 0.5 and 1 gm of tryparsamide were then well borne but when 1.2 gm of the drug was administered the patient complained of sudden weakness and nausea and presented redness and oedema of the face and mild conjunctivitis. A few minutes later a localized urticaria-like eruption developed and this was followed by a diffuse erythema of the whole body. This eruption disappeared in one or two days and the patient felt perfectly well. IV Y

VAN DEN BRANDEN (F.) & POTTER (R.) Essais de perfectionnement du contrôle biologique des glyphénarsines (Tryparsamide Tryponarsyl Novatoxyl Trypothane) [Attempts to perfect the Biological Control of the Glyphenarsines.]—*Ann. Soc. Belge de Méd. Trop.* 1938. June 30 Vol. 18 No. 2. pp. 299-311. With 1 fig. [11 refs.]

This work on tests for the toxicity of the glyphenarsines all appears to have been published elsewhere, and has already received notice in this *Bulletin* [1933 Vol. 30 p. 788 1934 Vol. 31 p. 207 1936 Vol. 33 p. 201 and 1938 Vol. 35 p. 349] IV Y

BERTÉ (M.) Procédé pour rendre indolores les injections sous-cutanées d'atoxyl. [Procedure for Rendering Painless Subcutaneous Injections of Atoxyl.]—*Bull. Soc. Path. Exot.* 1939 Feb. 8. Vol. 32. No. 2. pp. 180-181.

The author has been impressed with the number of patients who objected to subcutaneous injections of atoxyl on account of pain. The method of mixing the drug with the citrated blood of the patient apparently obviated this difficulty. It then occurred to Berté that as the pain of intravenous injection of 90 per cent alcohol is completely suppressed by sodium citrate possibly this substance might prevent the pain due to subcutaneous injections of atoxyl. The present method adopted by the author is to dissolve the dose of atoxyl in 10 per cent solution of sodium citrate and he has been assured by patients that this simple device suffices to prevent pain. IV Y

HAWKING (Frank) A Note on the Trypanocidal Action of Atebrin in Relation to its Absorption by Trypanosomes.—*Ann. Trop. Med. & Parasit.* 1938. Dec. 21 Vol. 32. No. 4 pp. 383-386.

FISCHL and SINGER and later OESTERLIN described experiments showing that atebrin was absorbed by trypanosomes but that it

exerted no trypanocidal action from which they concluded that although the absorption of a chemotherapeutic agent is a necessary preliminary to its parasitocidal action it is not identical with it.

Hawking has reinvestigated this matter using the technique described by the reviewer and his colleagues, and has reached the conclusion that atehrin is but slightly absorbed by trypanosomes and that its degree of absorption is in relation to its small trypanocidal activity.

IV Y

LESTER (H. M. O.) The Results of Sleeping Sickness Work in Northern Nigeria.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939 Feb. 28. Vol. 32, No. 5 pp. 615-627.

In this paper the author gives an interesting summary of the results of sleeping sickness work in Northern Nigeria during the last few years. Prior to the appointment of special sleeping sickness medical officers in 1927 a few hundred cases were treated each year at general hospitals and at Sheni. Between 1928 and 1930 sleeping sickness officers toured parts of the Northern Provinces, treating such cases as came to them to the number of 3 000 to 4 000 a year but as it was difficult for a touring medical officer to stay in any village for more than a short time few patients completed treatment.

In 1930 every effort was made to persuade patients to attend regularly for a full course of injections. No attempt was made at compulsory examination and treatment was voluntary. Towards the end of 1930 the system of compulsory surveys and mass treatment was inaugurated. It soon became evident that a large part of the central region of the Northern Provinces was heavily infected, and there were signs that the disease was spreading rapidly. It then became realised that when dealing with hundreds of thousands of cases the cost of surveying the whole area regularly would be prohibitive once a mass survey has been completed and all cases treated a field dispensary is established to deal with relapses and fresh infections. Adequate protective measures are essential anti-tsetse clearing by local communities and in some instances the removal and concentration of the population are the only certain methods of controlling the disease.

In 1937 a special Sleeping Sickness Ordinance was enacted to give the necessary legal powers, a scheme for the expansion of the Service was approved and a grant of £19,000 a year for five years, was obtained from the Colonial Development Fund to pay for a control service provided that Nigeria financed the improvement of the treatment service considered necessary.

Details are given of the present state of affairs in the various infected emirates. These must be consulted in the original by those interested. The following are the conclusions —

The findings have been given for a series of resurveys in different parts of Northern Nigeria during the last 12 months. Out of 149,820 people examined in all areas, only 2,320 cases were found, an average infection rate of 1.6 per cent. The average rate of the original surveys of the same areas was 9.4 per cent. In only one locality the Ganawuri villages which were moved to a tsetse free site, can protective measures have had anything to do with this reduction in the infection rate.

The establishment of field sleeping sickness dispensaries in the districts which have been surveyed and treated has played a big part in reducing the infection rate and in controlling the disease. In many

localities once the incidence has been diminished by mass treatment, dispensaries can cope with relapsed cases and fresh infections. Attendance at dispensaries has been greatly helped by the propaganda value of the surveys.

Although the success of this intensive treatment campaign is undoubtedly there must be no relaxation of effort. At present sleeping sickness is more or less confined to the central parts of the country in the neighbourhood of lines of communication and mining areas. Fortunately it has not yet spread to the peripheral zones which both in the east and west are heavily infested with tsetse fly.

There are some infected areas which have not been surveyed yet and there are others where resurveys are urgently needed. Up to 1935 there was evidence that sleeping sickness was still spreading in spite of all efforts, but since then there has been a great improvement. The disease is now much more under control and large scale protective campaigns have been started to consolidate the gains of recent years. It is to be hoped that in a short time mass treatment will only be required occasionally in a few areas and that communal protective clearings and voluntary treatment at dispensaries will be sufficient to control the disease.

IT]

JACK (R. W.) Annual Report of the Division of Entomology for the Year ended 31st December 1937—*Rhodesia Agric Jl* Vol. 35 No. 8. pp 652-676 also as *Bull Minist Agric (S Rhodesia)* No 1080 25 pp Salisbury August 1938. (Summarized in *Rev Applied Entom.* Ser B 1939 Feb Vol. 27 Pt. 2 p 20]

In the course of the medical and veterinary section of this report, J. H. Chorley gives an account of the situations in 1937 in the various localities in Southern Rhodesia in which control measures against *Glossina morsitans* Westw., were or had been carried out. The history of controlled game destruction and the creation of fly free buffer zones as a measure for checking the advance of the fly is very briefly reviewed, and it is pointed out that this measure has now passed the experimental stage and can with confidence be applied to any area on the periphery of a fly belt, wherever land is required for development. The immediate objects of the present policy in the various districts is outlined, but it is also suggested that the fly might be eradicated from all the infested areas in the Colony by judicious and cautious extension of controlled game destruction over a period of years and that this could be combined with the establishment of game sanctuaries in the areas cleared of fly so that no extermination of species of game animals would take place. In areas in the low veldt where elephant and rhinoceros are abundant, other measures, such as bush and tick clearing might have to be employed. Rhinoceros cannot be driven, are very localised and remain for years in the vicinity of a few favoured water holes. The area to which these measures might be applied lies outside the zone of European settlement and little mining activity is likely to develop. During the year a further area of 1,500 square miles was reclaimed.

A number of cases of trypanosomiasis of cattle occurred during the year on farms adjacent to the Nelssetter border. As most of these farms were in the basins of the Inyamadzi or Chiredza rivers or were connected by a forest belt with them, further clearing was undertaken at the junction of these two rivers where they cross the border the clearing being made approximately three-quarters of a mile wider at this point. The original clearing was maintained, all re-growth being slashed back, and grass-burning was successfully carried out in October. A further spread of *G. morsitans* in Portuguese East Africa towards the border was recorded, flies being taken at a point not more than five miles from the border.

clearing, so that the threat of invasion at the southern end of the Moleatter district has increased.

"*Amblyomma lebrunum* Koch, has extended its range northward from Vatabeleland to the Gwelo and Hartley district.

LATYER (G) La lutte contre les glossines. [The Combat against Glossina.]—*Ann de Méd et de Pharm Colon* 1939 Jan-Feb-Mar Vol 37 No 1 pp 27-40

A general discussion of measures adopted against tsetse these must depend on local conditions. By a careful study of these one will avoid errors, failures and loss of time and money. The study involves examination of the terrain, identification of the species of Glossina which infest it their biology and particularly their association with the vegetation. The entomologist should work in conjunction with the botanist and a forestry officer. The paper continues in this way with generalizations, and must be consulted in the original by those interested. W Y

MALARIA

PRICES OF ABSTRACTS IN THIS SECTION

WILSON (p 676) contrasts the fully immune state of the Digo tribe of Tanganyika Territory who are constantly infected and show no apparent ill effects in adult life, with the incomplete immunity of the Nyiramba tribe less exposed to constant infection, the adults of which suffer from attacks during the transmission season. In the former treatment should be limited so as not to interfere with the acquisition of immunity since anopheline control is impossible. In the latter treatment and control are indicated. He describes the parasites of *P. falciparum* seen in immune and non-immune persons.

SARIKJAN (p 677) shows that in Central Russia the majority of primary attacks in infants occur in the first half of the year probably because a large proportion of cases have long incubation periods.

CORRADETTI (p 677) states that malaria only occurs in the wet season in the region of Lake Tana, and that highlands above 2,000 metres are free throughout the year. He recommends prophylactic quinine in the rainy season. CICCHETTO (p 678) in Italian Somaliland finds *P. falciparum* to be the commonest parasite. Infection with *P. vivax* gives the highest spleen rate and the largest spleens.

In the Bahrein Islands, AYRIDI and MAJID (p 678) found malaria to be an important disease. *A. stephensi* is probably the only vector but is very prevalent breeding in drains, pools, wells and seepage pits. All three *Plasmodia* are found.

FARIXAUD *et al* (p 679) show that in Saigon-Cholon sporadic outbreaks of malaria occur in what is an area of extremely low endemicity. *A. taeniorhynchus* is the commonest anopheline and it may be that the enormous proliferation of this comparatively ineffectual vector is responsible for the limited transmission which takes place.

CALLENDER and GENTIKOW (p 679) attribute the higher incidence of malaria in the United States Army personnel than in the Canal employees in Panama to greater exposure and lack of immunity.

Pinto (p 680) shows that *A. gambiae* first found in Brazil in 1930 and transported there from Africa is now breeding extensively in water of many types. Sporozoite rates as high as 30 per cent. have been found, and epidemics of malaria with high mortality caused. Buxton draws attention to the gravity of the position.

Roy *et al* (p 681) remark on the prevalence of *A. stephensi* in Calcutta. It is not there a carrier of malaria though in certain other cities it is dangerous.

Sivalingam (p 681) found higher parasite counts in primary cases of *P. vivax* infection than in relapses or reinfections. Usually in primary cases high counts were associated with subsequent high temperatures but this was not so in the others.

Boyd and Kitchen (p 682) consider that if infected mosquitoes are applied to several patients consecutively the numbers of sporozoites in their glands progressively diminish. With small numbers (1-5) of mosquitoes there are significant differences in the characters of the infections produced in the first and last patients the latter having long incubation periods and short attacks. These short attacks therefore may be as significant of inadequate infection as of immunity. They also (p 682) report an incubation period of 304 days in a patient aged 15 infected with the McCoy strain of *P. vivax*.

Strickland (p 682) discusses the quinine supplies of India.

Fastovsky and Chendergitch (p. 683) after a comparative test of quinine and acrinine alone or in conjunction with plasmodine in treatment consider that the latter is as effective as the former and suitable for mass treatment. Early relapses were most frequent in *P. falciparum* infections.

Stauss (p 683) states that the daily dose of plasmoquine now regarded as sufficient is 0.01 gm. per 10 kilos body weight. He discusses the by-effects abdominal symptoms methaemoglobinaemia and blood changes. By-effects are rare with atebirin but may follow intravenous injection. The ratio of plasmoquine to atebirin should be not more than 1 to 20 as in Atepe tablets.

Pizzillo (p 685) reports three patients with recent malaria who required a second course of adrenalin treatment for cure. This treatment represents an exact reproduction of the process of spontaneous recovery.

In the *Bulletin de l'Institut d'Hygiène du Maroc* (p 686) it is stated that the guiding principles in prophylaxis are standard treatment in epidemics clinical prophylaxis of children in endemic areas and eradication of the disease in areas of feeble endemicity. The state of premunition governs the dose and rhythm of drugs as prophylactics. Weekly administration is sufficient in Morocco. Simeons (p 686) obtained excellent results in the eradication of severe endemic malaria by mass treatment by atebirin injections and plasmoquine followed by the treatment of subsequent cases by atebirin injections alone. The relapse rate was very low unlike the high rate observed in the treatment of sporadic cases elsewhere by atebirin injections and the author considers this to be due to the immunity already developed in the people of the endemic area. Immunological grouping is therefore important in treatment. Work by Winchester (p. 687) on two comparable groups of persons in Georgia, U.S.A. subject to infection with *P. falciparum* has shown considerable reduction in parasite indexes and spleen rate in the group receiving prophylactic atebirin, as compared with the control group.

TIBOURSKAJA (p. 687) found that quinoline No. 31 0.03 gm thrice daily administered to gamete carriers of *P. vivax* and *P. falciparum* rendered them incapable of infecting mosquitoes. In *P. vivax* cases the gametostatic effect lasted five days. In *P. falciparum* infections a smaller dose was sufficient. C W

HACKETT (L. W.) Le più recenti ricerche sulla malaria ed alcune loro applicazioni (Recent Researches on Malaria and Some of their Applications.)—*Rendiconti Istituto di Scienza Pubblica*, Rome, 1939. Vol. 1 Pt. 2. Pp. 433-447 With 7 figs. on 3 plates.

An interesting lecture which covers practically the whole field of malaria research. It provides an admirable summary of modern conceptions regarding the epidemiology of the disease. Norman White

WILSON (D Bagster) Implications of Malarial Endemicity in East Africa.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939 Jan. 28. Vol. 32, No. 4. pp. 435-446 With 1 fig. [13 refs.] Discussion pp. 447-465 With 1 graph.

The authors avowed intention in presenting this paper was to arouse discussion on "the relevance of what has been called natural immunity to malaria in deciding on an anti-malaria policy. This immunity is defined as a state of acquired resistance to the ill-effects of the presence of malaria parasites, obtained by natural infection which is probably dependent upon the persistence of parasites in the immune organism. The unorthodox use of the phrase natural immunity to describe an acquired condition was unfortunate as it acquired a prominence in the discussion that was hardly justified in view of the clear definition quoted above.

A comparison is made of malaria as it occurs among the Digo of the East African coast with the malaria observed among the Nyanmba, a Bantu tribe living on a plateau in central Tanganyika. The former is an example of hyperendemic malaria to which full immunity is acquired. The spleen rate 85 per cent in children falls to 39 in adult life with a corresponding fall in the parasite rate. The average parasite count varied from 7000 per cmm. in infants to less than 200 in adults. There was a marked seasonal increase in the parasite counts of infants and very young children but none at later ages. Whatever the intensity of infected anopheline infestation of houses, there were no apparent ill-effects in older children or adults attributable to malaria. It is estimated that among these Digo an individual is likely to receive an infective bite twelve times a year. Anopheline control is economically impossible. Attempts at curative treatment, sufficient to interfere with the acquisition of a solid immunity should be avoided. Treatment in the first year or two of life pending the acquisition of this immunity should only be sufficient to save life. The malaria of the Nyanmba is also hyperendemic but the immunity they acquire is incomplete. The spleen rate of children is 87 per cent., 68 in adults. The parasite rate declined with age but the decline was very small in the wet season. Adults suffer from attacks of malaria during the transmission season. Anopheline breeding is seasonal. Anopheles were found in houses during only eight months. The

estimated number of infected bites an individual receives a year is between 4 and 8. The seasonal nature of infection explains the incomplete immunity acquired. In the case of these people drug treatment or anopheline control or both, are indicated.

P. falciparum is the predominant species the author believes immunity to *P. falciparum* to be very evanescent. He describes morphological differences of *P. falciparum* as seen in the blood of immunes and non immunes respectively. In non immunes the parasites are almost monomorphic, minute or very minute rings one to four in a cell, *appliqué* forms common and stippling of the cell difficult to obtain. In immune persons the parasites are more polymorphic.

It is to be hoped that the author will have ample opportunity of following up several promising lines of inquiry foreshadowed in his paper

N IV

SARIKJAN (S. J.) Contribution au problème de la fréquence du paludisme dans la population puérile au moment d'une explosion épidémique dans la région centrale de RSFSR. [Incidence of Malaria among Child Population in an Epidemic Outbreak in the Central Region of the USSR.]—*Med. Parasit. & Parasitic Dis.* Moscow 1938. Vol. 7. No. 4. [In Russian pp. 551-558. [19 refs.] French summary p. 558.]

When malaria appears in epidemic form in the central regions of the USSR, children not excluding infants suffer most. The majority of primary attacks of malaria in infants occur in the first half of the year more especially in the second quarter. This is probably attributable to the large proportion of cases with prolonged incubation periods. Cases of primary malaria in infants born in the preceding autumn or winter have shown that infection with malaria is possible not only in the event of the mother suffering from active malaria during pregnancy but also if she is in the period of these prolonged incubations. Moreover in the winter and early spring primary attacks may be caused by mosquitoes which have been hibernating.

N II

CORRADETTI. Epidémiologie du paludisme dans la région du lac Tsana. [Epidemiology of Malaria in the Lake Tsana Area.]—*Bull. Office Internat. d'Hyg. Publique* 1938. Dec. Vol. 30. No. 12. pp. 2793-2795.

Inquiry carried out at the end of April and the beginning of May failed to reveal the presence of any important anopheline vector of malaria. *A. cinereus* was found as were *praedariensis transvalensis mauritanus* and larvae resembling *longipalpis*. The author concludes that in the parts of Gondar visited malaria does not occur in the dry season. Areas above 2,000 metres are free from malaria throughout the year. At lower levels malaria can occur during and after the rains. Further observations are called for in the rainy season. He recommends prophylactic quinine 0.60 gm. on three consecutive days each week from June to October inclusive in areas below 1,600-1,700 metres. In areas about 1,800 metres similar doses of quinine should be taken from the middle of August to the end of October.

N II

CICCITTO (Angelo M.) Ricerche sugli indici malarici-splenico e parasitario—nella Somalia Italiana. (Parasite and Spleen Indexes in Italian Somaliland.)—*Riv. di Malarologia*. Sez. I. 1938. Vol. 17 No. 5 pp. 396-410 [13 refs.] French summary

The author bases his study on malaria patients treated in the hospitals of Mogadisco during four years 1934-37. The patients came from most parts of the colony. *P. falciparum* was most in evidence, 60-65 per cent. of cases versus 30-35 per cent. *malariae* 5-8 per cent. The percentage of parasite carriers among those with enlarged spleens was almost identical with the percentage of enlarged spleens among parasite carriers. Enlargement of the spleen was most frequent in *vivax* infections and the degree of enlargement was greatest. Very large spleens were rare in *falciparum* infections. The spleen rate was lowest in *malariae* infections though very large spleens were more common than in *falciparum* infections. N W

AFKIDI (M. K.) & MAJID (Syed Abdul) Malaria in Bahrain Islands (Persian Gulf)—*Jl. Malaria Ind. of India* 1938 Dec Vol. 1 No. 4 pp. 477-472. With 3 maps & 1 chart. [14 refs.]

This, the first published malaria survey of the Bahrain Islands, was carried out during a fortnight in January and five weeks in the following May and June. The inquiry was confined to the main Island of Bahrain and the adjacent islet Muharrak. Two considerable towns, Manama, population 40,000 to 50,000 and Muharrak population 30,000 to 40,000 were included in the survey. The hot humid climate is characteristic of the Persian Gulf. The average annual rainfall is but 3½ inches and there are only from 3 to 6 rainy days a year. The main island is 30 miles in length and has an area of 108 square miles. Cultivation is confined to narrow belts of date palm plantations. Here there are copious springs of warm and slightly brackish water. The total population of the archipelago is estimated at 150,000. Pearl fishing is the important industry. Recently oil fields have been discovered.

There are no morbidity nor other vital statistics available. It appears, however, that malaria has always been an important cause of sickness. Malaria is responsible for nearly a quarter of the cases treated at the Manama Hospital. The spleen rate for 234 children between 4 and 14 years of age in Manama was 38.9—the corresponding rate for Muharrak town was 13.1. The parasite indexes for these towns were 21.8 and 6.3. The anophelines identified were *stephensi*, *fluvialis*, *culiseta*, *pulcherrimus* and *sergenti*. *A. stephensi* was much the most prevalent and the only species found infected. It is probably the only vector. It was found breeding in agricultural drains, leakage pools, shallow domestic wells and garden pits containing seepage water. In some dammed irrigation wells and garden pits increase in the salinity of the water precluded the breeding of *A. stephensi*. In the 34 positive blood films, among the 249 examined in January the species of parasite found were—*falciparum* 10 versus 13 *malariae* 10 and *falciparum* with *malariae* 1.

This interesting and well documented report concludes with a series of recommendations concerning the temporary and permanent control of malaria in Bahrain. N IV

FARINAUD (E.) RAMIJEAN (R.) & FAVOT (M.) *Nouvelles recherches sur le paludisme à Saigon. [New Investigation of Malaria in Saigon.]—Rev Méd Française d'Extrême-Orient* 1938 Aug-Sept Vol. 20 No 7 pp 878-888 With 1 folding plan

Localized outbreaks of malaria occur in Saigon-Cholon from time to time. There has however been considerable discussion as to whether indigenous malaria occurs in Saigon at all. The two contiguous towns of Saigon and Cholon now united, have a population of about 360 000 unevenly distributed over an area of 55 square kilometres. The European and commercial parts of the town are well constructed but towards the fringe of the urban area native huts are scattered or grouped in what are for all practical purposes villages separated by varying distances one from the other. In these outlying parts of the town swamps and marshes communicating with the network of channels and canals that surround the town, are a prominent feature.

During the three last months of the year 15 000 children from 2 to 12 years of age in all parts of the town were examined. The estimated child population of these ages of the town is 77 000. The spleen rate was 1.36 per cent. varying in the 18 different quarters of the town from 0.15 to 3.66. The parasite index was 2.92 per cent. varying from 1.22 to 11.42. Nearly all the enlargements of the spleen observed were very small. The quarters of the town most infected are all on the outskirts near water channels or inundated land. In the maternity hospital the percentage of cases in which child bearing was complicated by an attack of malaria was 4.32 in 1937 and 3 during the first six months of 1938.

There are undoubted foci of malaria infection in Saigon-Cholon but the low endemic indexes indicate seasonal or sporadic outbreaks occurring in an area of extremely low endemicity.

The species of *Anopheles* found are *barbrosistris sinensis vagus philippinensis kochi* and *lessellatus*. *A. vagus* is much the most frequent representing almost the totality of adults captured. No important vector of malaria occurs in any numbers and the hypothesis is put forward that perhaps the enormous proliferation of such an ineffectual vector as *A. vagus* may be responsible for the limited transmission that does occur.

In spite of the little importance of malaria the authors urge the importance of filling marshes and inundated land within town limits.

A IV

CALLENDER (G. R.) & GENTIKOW (C. J.) *Malaria in the Panama Canal Department United States Army* I. Incidence of Primary Cases in 1936 and 1937—Reprinted from *Milit Surgeon* 1938 Oct. Vol. 83 No 4 pp. 299-316 With 3 figs. [18 refs.]

The incidence of malaria in the United States Army in Panama is more than thrice as high as that among employees of the Panama Canal. Among the reasons for this higher incidence are the closer proximity to anopheline breeding places of certain army posts, exposure at subposts most of which are in unsanitated areas and some of them unscreened and exposure during military operations in unsanitated areas. The Canal Zone employees are both coloured and white. The former have an immunity to *P. vivax*. Old residents have frequent recourse to quinine. In 1935 and 1936 *P. falciparum*

was responsible for 76 per cent. of the total cases of malaria among the coloured employees but only 30 per cent. among the white. In soldiers in 1936 *falciparum* was responsible for 41.7 per cent. of primary cases and 12 per cent. of relapses. Military personnel on arrival have no immunity—their tour of service in the Zone is from two to three years.

Among the soldiers there was no real decrease of primary malaria incidence in the ten years 1927-36 the annual rates fluctuating between 31.86 in 1932 and 63.84 in 1933 per 1 000 of strength. The incidence of malaria contracted in posts and subposts in 1937 was somewhat less than in the previous year—an improvement that is attributed to more efficient screening efforts at preventing mosquitoes entering buildings, and the more intensive use of insecticide. N II

GARC (Gabriel) Índice esplénico en el Valle de Azapa. (Comunicación preliminar) [The Spleen Index in the Azapa Valley]—*Rev Chilena de Hig y Med Preventiva* 1933. July-Sept. Vol. 1 No. 7-9 pp. 393-398.

COLLIGNON (E.) La campagne antipaludique de 1937 dans le département d'Alger—*Arch. Inst. Pasteur d'Algérie* 1938 Sept. Vol. 16 No. 3 pp. 323-337 With 8 figs. on 4 plates & 2 diagrams.

AMIALET (R.) La campagne antipaludique de 1937 dans le département de Constantine.—*Ibid.* pp. 333-350 With 2 text figs. & 6 figs. on 3 plates.

GOLOET (R.) La campagne antipaludique de 1937 dans le département d'Oran [The Anti Malaria Campaign of 1937 in Algiers, Constantine and Oran.—*Ibid.* pp. 351-359 With 3 text figs. & 8 figs. on 4 plates.

GILLET (R.) Etude épidémiologique du paludisme à El Golea en 1937 [Epidemiological Study of Malaria in El Golea in 1937]—*Ibid.* pp. 360-381 With 1 map & 4 plates.

PINTO (G. de Sousa) L'invasion du Brésil par l'*Anopheles gambiae* et ses conséquences [The Invasion of Brazil by *Anopheles gambiae* and the Sequel.]—*Rev de Malariologia* Sez. I 1933. Vol. 17 No. 6 pp. 475-490.

In March 1930 SHANNON discovered *Anopheles gambiae* the great carrier of malaria in Africa, breeding at Natal in Eastern Brazil [this *Bulletin* 1932, Vol. 29 p. 834]. It was clear that the insect had been transported across the Atlantic and had recently established itself.

The present paper tells us that any misgivings that may have been felt have been fully justified. The insect is breeding in water of many types and spreading. Sporozoite rates as high as 30 per cent. have been found more than once and very widespread epidemics of malaria have been caused, accompanied by a high death rate—the case mortality being 6 to 15 per cent. In the author's view insects probably came across as adults in the weekly boat from Dakar West Africa; aeroplanes are fewer and are less likely to have carried the insects, though it is scarcely correct to say that an aeroplane would offer no opportunity of travel to a mosquito.

[The event is very grave—the invasion of tropical America by the world's most versatile and dangerous carrier of malaria. This outbreak still lacks a historian though it may be the gravest insect-borne epidemic of history. The present paper is disappointing for it

gives no information about the previous prevalence of malaria in the area invaded or about to be invaded it gives no information about the insect's rate of spreading or whether it is advancing by road and rail or across the countryside it tells nothing of the area now covered, or the population now exposed to risk it does not discuss the measures undertaken or planned for dealing with the situation] *P. A. Buxton*

ROY (D. N.) CHANDRA (S. N.) & SIDDONS (L. B.) On the Presence of a Zoophilic Race of *A. stephensi* in Calcutta.—*Jl Malaria Inst of India* 1933 Dec. Vol. 1 No. 4 pp. 417-428 [22 refs.]

The history of malaria in Calcutta is full of puzzles and anomalies. The authors of the present paper call attention once again to the abundance of *Anopheles stephensi* in the city and to the fact that it is not a carrier of malaria, though it is so dangerous in certain other cities in India. They have carried out successful precipitin tests on 115 individuals captured in Calcutta only four of these contained human blood the remainder being positive for cow or buffalo [One would gladly see a much larger collection of figures taken from different parts of the city and throughout the year]

P. A. Buxton

HOFFMANN (Carlos C.) La formación de razas en los anopheles mexicanos. II. *Anopheles albimanus* y sus variedades en la República Mexicana. (Races of Mexican *Anopheles*. I. *albimanus* and its Varieties.)—*An Inst Biol Mexico* 1933. Mar & June Vol. 9 Nos. 1 & 2 pp. 167-180 With 7 figs. [12 refs.] German summary

DEL VECCHIO (Gaetano) Sugli anofellini esistenti in provincia di Littoria. Nota Preventiva. [The Anophellines of the Province of Littoria.]—*Riv di Malariaologia* Sez. I. 1933. Vol. 17 No. 6 pp. 425-430 English summary (8 lines)

ZOV (B. H.) Zoutwatervischvijvers en malaria. [Salt Water Fish Ponds and Malaria.]—*Granssk Tijdschr v. Nederl Indit* 1933 Feb. 23 Vol. 79 No. 9 pp. 529-540 [14 refs.]

SIVALINGAM (V.) Enumerative Studies in Benign Tertian Malaria.—*Indian Med Gaz* 1933 Dec. Vol. 73 No. 12 pp. 715-720 [11 refs.]

Parasites were enumerated in 50 cases of *P. vivax* malaria. Of these cases 22 were primary, the remainder being subsequent cases the author's designation for relapses and reinfections. The observations were made in a district of Ceylon which was free from malaria prior to the epidemic of 1934-35. Sinton's method of enumeration was used. Blood smears were made a few hours before an anticipated paroxysm. Parasite counts were higher in primary cases. Thirteen of the 22 primary cases had counts of over 10,000 per cmm. as compared with 8 of the 28 relapses and reinfections. In primary cases high counts were associated with subsequent high temperatures but there were exceptions. No such relation between parasite count and degree of fever appeared to exist in subsequent cases. The author concludes that about 900 parasites per cmm. are necessary to produce fever in primary attacks about 500 are sufficient in subsequent attacks.

N. W.

BOYD (Mark F) & KITCHEN (S. F) The Clinical Reaction in Vivax Malaria as Influenced by the Consecutive Employment of Infectious Mosquitoes.—*Amer J Trop Med* 1938. Nov Vol. 18. No. 6. pp 723-728.

In carrying out immunity observations mosquitoes destined for application on the test case were previously and subsequently applied to patients considered wholly susceptible. Intervals of three or four days elapsed between successive applications of any given lot of mosquitoes. Data concerning 116 inoculations done in this manner are considered in the present report. It is inferred that if mosquitoes be applied to several subjects consecutively the number of sporozoites in their glands will gradually be depleted. There is moreover a certain mortality in lots of mosquitoes thus treated which reduces the number of sporozoites inoculated in the later patients. Results obtained with lots consisting of 1-5 and 6-10 mosquitoes are compared. With the smaller number of mosquitoes there are significant differences in the character of the infection experienced by the first and last patient of a series. Patients infected in the last application tend to have longer incubation periods and shorter attacks. These differences are not observed if many mosquitoes are employed. The duration of the clinical attack following inoculation by a moderate number of infected mosquitoes tends to vary inversely with the duration of the incubation period. Attacks of less than eight days duration may be as significant of inadequate inoculation as of immunity.

A 17

BOYD (Mark F) & KITCHEN (S. F) An Instance of Prolonged Latent Incubation Period in a Patient Infected with a North American Strain of *Plasmodium vivax*.—*Amer J Trop Med*, 1939 Nov Vol. 18 No. 6 pp 729-731

A patient aged 15 was bitten by 12 *A. quadrimaculatus* infected with the McCoy strain of *P. vivax* on 21st June. 10 of these mosquitoes were re-applied to the patient four days later. The re-application was prompted by the light quantitative incidence of infection in this lot of mosquitoes. The inoculation was regarded as a failure the patient was returned to the general wards of the hospital but smears of his blood were taken at weekly intervals. On 21st April, 304 days after the first application of mosquitoes, the patient had a chill and *P. vivax* was found in the blood. The attack lasted 24 days and terminated spontaneously. The patient had been housed in a screened ward there had been no autochthonous case of malaria in the hospital during the previous two months. Inoculation experiments indicated the probability almost certainty that infection was due to the McCoy strain.

A 17

STRICKLAND (C. F) Quinine and Malaria in India. Indian Village Welfare Association.—19 pp. 1939 London Humphrey Milford, Oxford University Press. [6d.]

This pamphlet is apparently designed to instruct, or to create public opinion regarding the supply of and demand for quinine the need for increased consumption of quinine in India, and the desirability of making India eventually self-sufficient with regard to cinchona cultivation and quinine manufacture. The present position with regard to these matters is described and a policy is advocated. The

policy is the creation of a government monopoly, a quinine control board would receive all quinine manufactured in or imported into India. Quinine would be sold at a fixed price to shopkeepers and at a fixed price by them to the public. For free distribution to necessitous persons, cinchona febrifuge would be used. There would be no free distribution of quinine. Meanwhile the quinine control board would push forward schemes for increased production. The difficulties, cost and advantages of such a scheme are discussed as is the necessity for international agreement. An informing pamphlet for the uninitiated

N II

FASTOVSKAIA (E.) & CHENDEROWITCH (R.) Données comparées sur le traitement de la malaria par la quinine et les produits synthétiques soviétiques antipaludéens, d'après le schéma établi par la commission du paludisme au comité d'hygiène de la Ligue des Nations. [Comparative Results of Treatment of Malaria with Quinine and Sovietic Synthetic Remedies in accordance with the Scheme of the Malaria Commission of the Health Committee of the League of Nations.]—*Med Parasit & Parasitic Dis* Moscow 1938 Vol. 7 No 3 [In Russian pp 299-334 With 2 figs French summary p 335]

An isolated village Pokrovskaia in a swampy area with a stable population suffering from endemic malaria was selected for experiment. *P. vivax* and *P. falciparum* cases are equally prevalent, the former being most prevalent in May, the latter in September. The village was divided into four districts in which malaria cases were treated in accordance with one of the four following methods—(1) Quinine 0.5 gm. twice a day for seven days. (2) Acriquine 0.15 gm. twice a day for seven days. (3) Quinine 0.5 gm. twice a day for seven days followed after a three days interval by plasmoquine 0.03 gm. twice a day for five days. (4) Acriquine 0.15 gm. twice a day for seven days followed after a three days interval by plasmoquine 0.03 gm. twice a day for five days. The complete treatment according to one or other of these methods was given to 1,485 patients. On the whole acriquine gave better results than did quinine. The percentages of relapses with methods 2 and 4 were 40.2 and 37.0 respectively. Quinine methods 1 and 3 had relapse rates of 44.6 and 44.4 per cent respectively. Half the relapses occurred within 45 days of the termination of treatment. These early relapses were most frequent in *falciparum* infections. The authors conclude that Sovietic synthetic remedies are in every way as effective as quinine and that in the doses used they can be recommended for mass treatment. N II

STAUSS (Hermann) Die klinischen Nebenwirkungen des Plasmoquins und des Atebrins. [Clinical By-effects in the Use of Plasmoquine and Atebrin.]—*Arch f Schiff u Trop Hyg* 1939 Jan. & Feb Vol. 43 Nos. 1 & 2 pp 19-32 55-73 [118 refs.]

Harmless by-effects which often follow the use of plasmoquine as well as the more serious which are rare have been reviewed by the author from the literature. He notes that malaria like syphilis gives rise to many symptoms apart from drugs and these must be considered. Complications such as amoebic dysentery and hookworm infections affect the blood picture markedly. Those symptoms which arise during administration of plasmoquine depend largely on dosage as

well as on individual and race. In the early days the dose given was much too large. That now recommended is 0.01 gram per ten kilo body weight per day. Stomach-ache nausea vomiting, diarrhoea tenesmus loss of appetite are some of the symptoms complained of. Other possible causes for these are discussed. Plasmoquine plus atebirin is not so well borne as either alone. If the ratio of plasmoquine to atebirin is not above 1:20 as in atepo tablets fewer complaints are recorded.

Other factors discussed regarding by-effects are food, race type of infection condition of the patient and gastric hydrochloric acid content. It is better to start plasmoquine treatment some days after the atebirin course is completed. During plasmoquine treatment a slight transitory albuminuria may arise with no permanent kidney damage. Malaria cases with albuminuria are said to benefit from plasmoquine. The cyanosis produced in some patients results from intracellular methaemoglobin formation. Pulse and respiration are not affected and the characters of an anaemia are absent. Blood vessels may contract or dilate accordingly as the drug content is low or high. The amount of methaemoglobin formed is not proportional to the dose of drug, but time and length of its appearance depend on dose to some extent. Ambulant cases treated with the drug rarely exhibited the sign, and its appearance does not call for discontinuation of treatment. Haemoglobinuria has rarely been noted following the use of the drug and according to one author methaemoglobin is chiefly present, whereas with B.W.F. haemolysis and oxyhaemoglobinuria are characteristic. In therapeutic doses plasmoquine is not haemolytic. Liver damage may arise from the drug or the disease.

Regarding the blood picture, the appearance of punctate basophilia, increase of lymphocytes changes in polynuclears and eosinophils seem to be inconstant, as well as the appearance of certain pathological white cell elements. Pulse arrhythmia during treatment was early described but is not generally noted, and blood pressure is not affected. In animals excessive dosage caused liver and other damage but electrocardiograms showed no abnormality till death approached. Transitory oedema of face and limbs, also seen in untreated malaria, has been noted. If given parenterally the intramuscular route should be used. It is claimed that all circulatory symptoms recorded during treatment with the drug can be seen in untreated malaria.

Atebirin is given as the bi-hydrochloride by mouth. The soluble dimethanesulphonate is used for injection. It often causes swelling at the site but abscesses are rare. The dose is 3×0.1 gm. daily for five days. Children take the drug well. As a prophylactic 0.4 gm. per week is taken. Decomposition occurs in aqueous solutions, and such should not be left more than twelve hours before use. The drug is partly decomposed in the body.

Alimentary canal symptoms are rare. Constipation and colicky pains have been described. In animals excessive doses may cause diarrhoea. In cases in which excretion was slow colicky pains have been reported. Aspirin hot packs or opium are recommended for treatment. Other causes for the pains are discussed.

Albuminuria is not caused by atebirin and according to some nephritis and nephroses do not contraindicate its use. The heart muscle as well as systolic and diastolic blood pressure remain unaffected except as noted with excessive doses in animals. The same is true of pulse and respiration and patients with endo- or myocarditis may take the drug, according to some authors.

By the intramuscular route absorption is rapid and intravenous dosage is never called for except in comatose or BWF cases. Weakness giddiness cramps and collapse may follow intravenous administration. The drug does not cause haemolysis either *in vivo* or *in vitro* nor does it form methaemoglobin. The changes in the white cell picture described vary with different authors. In so far as it does not affect the heat regulating centre atebirin is not an antipyretic. Being a dye it is absorbed by the tissues and a higher dose may be required at the start to give the full therapeutic effect. Psychic and neurological symptoms are described by KINGSBURY during malaria treatment with the drug. The present author discusses his views.

The yellow coloration of varying intensity which may appear in the skin of a patient from the fourth day of treatment till eight days after its cessation may last as seen in one case for 69 days. It is due to impregnation of the skin with the drug and has no relation to icterus. The conjunctivae generally escape and there are no records of vision being affected. Atebrin may even be given if icterus is present. Whether the drug can be re-absorbed from the skin and give rise to therapeutic effect is not known. Bilirubin does not appear in the urine following use of the drug. The diagnosis of atebirin coloration is given as well as the views of different authors on drug accumulation which is affected by many factors. It is of interest that distribution of the drug in tissues of generative organs does not affect reproduction. Some other diseases in which the above two drugs are useful have been described.

The last part of the article is devoted to an attempt to demonstrate the advantage of these two synthetic agents over quinine as regards accompanying by-effects. The author adduces in favour of the value of these two compounds the fact that similar types have been made in France and Russia.

J D Fulton

PIZZILLO (Giuseppe) Sulla cura adrenalina venosa nelle infezioni malariche. Nota XII. Possibilità di un trattamento ripetuto [Intravenous Adrenalin Treatment of Malaria Possibilities of Repeated Treatment].—*Riv di Malarologia* Sez. I 1938 Vol. 17 No 5 pp 386-395 With 9 graphs. German summary.

This is a report of three cases of malaria two *vivax* and one *falciparum* infection all of comparatively recent date which were treated by Ascoli's method. The immediate results of the treatment appeared satisfactory but the disease was not eradicated. Fever returned and a second course of adrenalin injections was administered to each. The intervals between the courses of treatment were 43 32 and 93 days respectively. After the second course of treatment all three patients regained complete health. All three cases illustrate the author's previous observation that the reactivation of the malaria parasite in a subject who has been adrenalized is attended with minimum deterioration of the patient's general condition and without renewed enlargement of the spleen. In the majority of cases the standard treatment of 30 injections is sufficient to produce a cure but that there are exceptions the three cases reported are evidence. The author considers that the treatment represents an exact reproduction of the spontaneous recovery from the disease. It is not surprising therefore that the intensity of treatment should have to be increased in certain

cases. Before deciding that the treatment has failed in any given case the advisability of repeating the course should be considered.

Λ W

BULLETIN DE L'INSTITUT D'HYGIÈNE DU MAROC. 1938. Jan.-June
No 1-2 pp 109-133 With 1 chart.—Extrait du rapport
annuel sur l'activité du service antipaludique en 1937 [Extract
of Annual Report on Activity of Anti Malaria Service in 1937]

Malaria work in French Morocco is now concentrated in the charge of an Anti-Malaria Service the Chief of which is directly responsible to the Director of Public Health. The Service has facilities for research and teaching at its administrative headquarters and anti-malaria stations in most parts of the Territory.

The year 1937 with which this report is concerned, had a rainfall well below normal, almost everywhere. As a result malaria was nowhere unduly prevalent. There were no severe epidemic outbreaks and pernicious attacks were not in evidence. Antilarval measures produced excellent results.

Guiding principles that have been adopted in the prophylaxis of malaria include—Standard treatment of cases of malaria in the presence of an epidemic; clinical prophylaxis of children and sufferers in endemic areas; and the eradication of the disease in areas of feeble endemicity in which such measures are justified. The dose and rhythm of administration of drugs used as clinical prophylactics in endemic areas vary according to circumstances; the most important of which is perhaps the state of premunition of the population. There are three methods of estimating the state of premunition—the splenometric index (the least reliable); the relation between the parasite index of adults and the parasite index of children; and the serological index. In practice two situations may arise. If the population living in a moderate or severe endemic zone is premunized, it is sufficient to treat the children and patients who present themselves for treatment. The spacing of the administration of the drug used, every 8, 10 or 15 days is determined by the intensity of the anophelism and the rate of gamete carriers. In the case of a population not or insufficiently premunized that is threatened by excessive prevalence of anophelines, the drug should be distributed to the whole of the population, the rhythm of the distribution being determined as in the preceding case. Experience in Morocco has shown that the weekly administration of drugs is sufficient in all circumstances arising in that country and that their administration twice a month is insufficient whenever anopheline prevalence reaches a very high level. Λ W

SMITHS (A. T. W.) Follow Up of a Mass Treatment with Injectable Atebrin.—*Indian Med Gaz.* 1938 Dec. Vol. 73 No. 12.
pp 713-715 With 1 chart.

The author previously reported the treatment of 5,600 persons at the Godak Mills in the Southern Deccan with two injections, on consecutive days, of 0.3 gm. of atebrin, followed by plasmoquine 0.01 gm. a day for three days. The relapse rate for the six following months was very low [See this *Bulletin* 1936 Vol. 33 p 797]. The subsequent malaria history of this community is reported in the present paper. Every effort has been made to ensure that all fever

cases are promptly reported to the doctor. Every new case of malaria was treated with two injections of atabrin. No plasmoquine was given nor any quinine. Oiling of pools in the river bed during the dry season was done. The chart produced gives the monthly incidence of malaria for $2\frac{1}{2}$ years before and $2\frac{1}{2}$ years after the mass treatment with atabrin injections. It illustrates a diminution almost amounting to eradication of severe endemic malaria. These results are at striking variance with the author's experience in treating elsewhere sporadic first or fresh infections with atabrin injections. In the latter the relapse rate was almost 100 per cent within one to six weeks. Oral administration of the drug gave better results in these cases. The author's explanation of his observations is that the injection of a powerful parasiticide in a primary infection reduces the parasite count so suddenly that the body is no longer called upon to produce immunity consequently an unchecked multiplication of residual parasites soon recommences. In a highly endemic malaria region a high degree of immunity already exists. It follows that an immunological grouping of cases is important in treatment.

A II

WILCHESTER (M. E.) Atabrine Prophylaxis in Malaria. Report of Third Year's Investigation.—*Amer J Trop Med* 1933, Nov Vol. 18 No 6 pp 625-639 With 4 figs [17 refs]

After reference to results obtained by several contributors to malaria literature by the use of atabrin as a prophylactic the author describes his experience in Harris Neck McIntosh County in south-east Georgia. This low-lying coastal area contains abundant breeding places for *A. quadrimaculatus*. In 1935 all persons harbouring parasites among a Negro population of 244 were given a five-day course of atabrin. Thereafter the population was divided into two groups of comparable age distribution. The prophylactic group received 50 mgm. of atabrin a day from May 15th to the end of October. The control group received no medication after the initial treatment. This procedure was continued in the two following years both groups being enlarged. The parasite indexes of the control group and prophylactic group in the spring of 1935 were 7.8 and 9.3 in the autumn of 1937 they were zero and 16.3 respectively. During the same period the spleen index of the prophylactic group fell from 46.1 to 9.3 and of the control group from 31.8 to 16.9. All infections were *falciparum*. The reduction of malaria was not attributable to meteorological conditions. The encouraging results have decided the author to continue the work. No toxic symptoms attributable to atabrin were encountered, though some individuals during the three years received as much as 25 gm. of the drug.

A II

TIBOURSKAJA (A.) La quinine No 31 comme médicament gametocyte. [Action of Quinine No 31 on Gametocytes].—*Med Parasit & Parasitic Dis* Moscow 1933 Vol. 7 No 4 [In Russian] pp 541-549 With 6 figs French summary pp 549-550]

The object of the investigation recorded in this paper was to determine the minimum daily dose of quinine No 31 necessary to eliminate the infectivity of gamete carriers for mosquitoes and the duration of this effect. The gametocytes of suitable patients were

counted. The patients were then bitten by large numbers of mosquitoes. Subsequent dissection revealed the percentage of these mosquitoes infected. The patients were then treated with quinine No 31 0.03 gm. either thrice twice or once a day. Twenty four hours after the last dose mosquitoes were again fed on the patients and subsequently dissected. In *errax* infections 0.03 gm. thrice daily eliminated subsequent infection of mosquitoes. Twice daily this dose prevented the subsequent infection of mosquitoes in 8 cases out of nine. In the ninth case two mosquitoes had each two oöcysts out of 44 dissected as compared with 13 infected of 22 before the administration of the drug. With a single dose a day infection was suppressed in two cases and more than halved in a third.

In three *falciparum* cases daily doses of 0.09 0.06 and 0.03 gm., respectively produced a complete gamostatic effect.

The duration of the gamostatic effect in *errax* infections following 0.03 gm. thrice daily is 5 days. A IV

PARROT (L.) CATANET (A.) & AMBIALET (R.) with the collaboration of J. CLASTRIER. Essai comparatif de prophylaxie collective du paludisme par la quinine et par les médicaments synthétiques (quinacrine et proquinine) (Algérie, mars 1935-juin 1936). [Comparative Study of Prophylaxis of Malaria with Quinine and Synthetic Drugs.] —*Arch Inst Pasteur d'Algérie* 1937 Dec Vol. 15 No 4 pp. 450-623. With 24 plates, 32 diagrams, 1 fig & 1 plan.

HENRY (A. F. N.). Sur quelques notions importantes concernant la sérocoagulation palustre [Serocoagulation in Malaria.] —*Arch Inst Prophylactique* 1938 Oct-Dec. Vol 10 No 4 pp. 290-301

LEPROSY

PRELIS OF ABSTRACTS IN THIS SECTION

MORALES MUÑOZ *et al.* (p. 690) report on leprosy in Colombia. Epidemiological and clinical information is given of 468 lepers in an institution, of whom 41 per cent. of males and 64 per cent. of females give a family history of the disease. Most of them came from a well known endemic focus.

KREMER (p. 690) shows that all reflexes may be affected in the neural forms and changes correspond roughly with the extent and severity of the disease. Changed reflexes do not return to normal after clinical cure.

ACANFORA (p. 691) reports that the Rubino reaction of the sedimentation of formalized sheep red cells in the serum of the patient is to a considerable extent specific for leprosy and suggests a modification in which known negative serum is used as a control.

FERNANDEZ (p. 692) using leprolin subcutaneously found that it provoked general, local and focal reactions in tuberculous leprosy no reaction in the lepromatous form and only local reactions in several non-lepromatous conditions.

HARRELTINE (p. 692) reporting on the National Leprosarium, Carville, states that benzocaine-chaulmoogra oil and hydriocarpate esters form the basis of treatment.

DA SILVA (p. 692) uses 30 per cent chaulmoogra in olive oil, or trichloroacetic acid for lesions of the upper respiratory tract, with the galvano-cautery for definite lepromata. VIGNE *et al* (p. 693) show that treatment with a nitrated chaulmoogra oil and novarsenobenzol produced improvement in a leper with positive Wassermann. TISSEUIL (p. 693) advocates the intradermal injection of the oils or esters of chaulmoogra and Gorli seeds in tuberculoid lesions. TISSEUIL and RIVALEN (p. 693) report good results from the use of Gorli preparations, but the unsaponifiable fractions were inactive. TISSEUIL and GUILHAUMOU (p. 694) failed to obtain beneficial results from intradermal injections of preparations of castor and cod liver oil and metbylene blue. VELDS (p. 694) found phenol red to be useless.

RADNA (p. 694) reports favourably on treatment by Loewenstein's vaccine combined with alepol or graumanyl. MALAIHOLLO (p. 694) shows that certain beneficial results occurred in patients treated for two months with intramuscular injections of serum from a sheep which had received injections of bouillon cultures of two strains of acid fast bacilli isolated from lepers.

MARIE SUZANNE (p. 695) states that there is a source of calophyllum oil in Indo-China.

FÉROV (p. 695) claims very good results in macular and nodular cases by the use of a copper compound *zymbil-cuivre*.

VISENEVSKY (p. 695) uses blockage of the sympathetic system or circular blockage of nerves of the extremities by novocain in the treatment of leprous lesions and ulcers. This method is based on the beneficial influence of anaesthetics on inflammatory processes.

CHOWHAN and CHOPRA (p. 695) advocate the use of cobra venom and the vitamin B complex in nerve leprosy. VILLELA (p. 696) advocates vitamin B₁ for the pains of nerve leprosy. Vitamins B₁ and C may aid the action of chaulmoogra.

GATTI and GAONA (p. 696) and UGARRIZA (p. 696) used cebion in addition to chaulmoogra with success in cases with septicaemia and abscesses.

General improvement and healing of ulcers took place in 15 patients treated by CLERCXX (p. 696) by diethylamine chaulmoograte.

KHAN (p. 696) obtained good results in the treatment of trophic ulcers by removing dead bone and affording rest and protection by plaster of Paris. MAYNARD (p. 697) also removes dead bone and uses a warmed mixture of beef suet ghee and beeswax as a dressing. Of 60 cases 50 healed within six months.

DE BRAUWERE (p. 697) describes treatment in the Congo. KEIL (p. 697) discusses heredity in leprosy.

In rats reinoculated with the bacillus of Stéfansky BURNET (p. 698) found no reaction similar to that of the Koch phenomenon in tuberculosis, but in mice some increased sensitivity was observed. Reinoculation stimulates phagocytosis in mice but only feebly in rats. MARCHOUX and CHORINE (p. 698) similarly failed to produce a Koch phenomenon in rats and conclude that in human leprosy superinfection may occur.

PRUDHOMME (p. 698) has preserved the virulence of Stéfansky's bacillus in Sauton's medium in which *Alcyon phlei* was growing at pH 6.5. GAVRILOV *et al* (p. 698) have grown the bacillus on Denys's medium and on potato but the maintenance of pathogenicity was difficult.

LYON (p. 699) shows that the leprosin reaction is not obtainable in rats. C W

MORALES MUÑOZ (Tomás) BERNAL LOZDOÑO (Mario) & DE SOUZA ARABJO (H C) La lepra en Colombia. Encuestas epidemiológicas [Leprosy in Colombia. Epidemiology]—*Rev Colombiana de Leptología* Bogotá. 1939 Mar Vol 1 No 1 pp. 6-35. With 8 figs

The figures given in this article are based on a study of 959 persons in the Cello de Loro lazaretto of whom 466 are segregated lepers 48 are children of those living there 62 are women living with the others but apparently healthy and 383 persons living in the environs (en la puerta) of the lazaretto in the neutral zone

Of the 466 lepers, 328 or 70.3 per cent are half-castes 78 black and 57 white or 16.7 and 12.2 per cent respectively their nationalities are tabulated and the districts from which they came. Of the total, 355 are males and 146 of these (41 per cent.) give a history of the disease in father mother or near relative of 111 females, 71 (64 per cent) have such a history The types of the disease are stated in a list giving them under fifteen subdivisions Other information includes the previous occupations of the inmates (50 per cent. having worked on the land) the length of residence duration of the disease, etc.

Forty-eight children of lepers were examined, 35 having been born in the lazaretto of these there were 23 boys and 23 girls, up to 13 years of age Four girls 8-12 years of age, show definite signs of leprosy and five other children—three boys of 6 7 and 13 years, and two girls of 8 months and 9 years respectively—show suspicious signs.

The chief points of this interesting study may be summed up as follows—

- 1 Of the 466 examined 85.4 per cent are over 20 years of age and 85.7 per cent are from the well-known endemic foci of Bolívar Atlántico and Magdalena
- 2 Forty-one per cent of males and 64 per cent. of females give a family history of the disease
- 3 Sixty per cent belong to the clinical types L2 and L3 and some have been segregated for more than 10 years without showing improvement 84 per cent have had the disease for four years or more.
- 4 About one-third, 32.4 per cent. have purely cutaneous or nervous lesions.
- 5 Of 383 living outside the leprosarium, of whom 51 per cent. were adults 1 woman has a perforating ulcer of the foot 1 girl shows a suspicious macule on the face and 2 children (girls) show suspicious symptoms.

[This is the first number of a new periodical devoted to leprosy and if the standard presented in this issue is maintained, the information should prove of much value to leprologists.] H H S

CREMER (Sylvio de Godoy) Contribuição ao estudo dos reflexos na lepra [The Reflexes in Leprosy]—*Rev Brasileira Leprológica*. S Paulo. 1939 Mar Vol 7 No 1 pp. 63-74

The results of this investigation support in general what we should expect from a knowledge of the pathology of leprosy The reflexes, superficial and deep were examined in various forms—cutaneous, nodular nervous, and mixed—and stages of the disease and details of

findings in individual patients are recorded. These may be summarized as follows: in purely cutaneous forms the reflexes are unaffected; in the forms which attack the nerves we would surmise changes and in fact all or any of the reflexes may be altered. In the purely nervous forms the degree of change corresponds roughly with the extent and severity of the disease; in the mixed forms in accordance with the degree of nerve involvement. It is noteworthy that after clinical cure of a patient reflexes which had been abolished or even diminished did not return to normal. Also in cases of neuritis in the course of the disease there may be exaggeration of reflex but not in neuritis of parts in which the reflexes had already been lost.

The above is the general rule as regards the behaviour of the reflexes; there are however exceptions though they are few. Some nerve cases of even three or four years' duration still retain their reflexes intact while others of only 5-6 months' standing show definite changes. It is suggested but further evidence is needed that the former are mild forms, the latter severe forms of the disease. If this is true their presence or absence may serve as a valuable prognostic aid in nervous leprosy.

H H S

ACANFORA (Giuseppe) Sulla reazione di Rubino [The Rubino Reaction]—*Ann. d'Igiene* 1939 Mar Vol 49 No 3 pp 152-159 [21 refs.]

The rubino reaction is the speed of sedimentation of washed formalized sheep erythrocytes in the serum of the patient. Defibrinated sheep blood is centrifuged and the plasma decanted. The cells are washed with saline several times and then suspended in an amount of saline so that the quantity of suspension equals that of the original blood taken. To this is added 10 per cent of formalin (40 per cent formaldehyde). Various dilutions of serum in saline are mixed with 0.2 cc. of the cell suspension to make a total of 1.0 cc. in tubes of 9-10 mm. internal diameter—

	1	2	3	4	5	6
	cc.	cc.	cc.	cc.	cc.	cc.
Serum	0.5	0.25	0.1	0.5	0.25	0.1
Saline	0.3	0.55	0.7	0.3	0.55	0.7
Formalized cell suspensions	0.2	0.2	0.2	—	—	—
Non formalized cell suspensions	—	—	—	0.2	0.2	0.2

Results are read after 15, 30, 45 and 60 minutes. Controls with non formalized cells are used. The reaction is positive if the agglutino-sedimentation occurs only with the formalized cells or is definitely more intense than with the non formalized cells.

In 23 tests on serum of patients with mixed leprosy the test was positive in 22. In 14 patients with pulmonary tuberculosis the test was negative; the non formalized cells settling more quickly. In 65 patients with other diseases (malaria, leishmaniasis, amoebiasis etc.) it was similarly negative.

The author suggests a modification in which instead of non-formalized cells a control of definitely negative serum is used with the formalized cells. In this case a positive result is shown by rapid sedimentation with the serum to be tested.

The test therefore appears to be to a considerable extent specific for leprosy [See also this *Bulletin* 1927 Vol 24 p. 557 1928, Vol 25 p. 978 1929 Vol 26 pp. 336 617 1930 Vol 27 p. 1006 1932, Vol 29 pp 553 850.] C IV

FERNANDEZ (José M M) Valor de la inyección subcutánea de leprolin en el diagnóstico de ciertas formas de lepra. [Subcutaneous Injections of Leprolin in the Diagnosis of Leprosy]—*Rev Brasileira Leprologia* S Paulo. 1939 Mar Vol. 7 No. 1 pp 85-90 English summary

The author has made subcutaneous injections of 1 or 1.50 cc. of leprolin in patients with lepromatous and neural types of leprosy lupus vulgaris lupus erythematosus and dermatitis facitita. He has observed

"1 In cases of tuberculoid leprosy the injection produces within 24 hours a general reaction consisting in rigors arthralgias, and temperature a local reaction at the site of injection and a focal reaction, with erythema and congestion of pre-existent lesions.

2 In the cases of lepromatous leprosy the injection of the same doses of leprolin does not produce any reaction

3. In cases of lupus vulgaris lupus erythematosus and artificial dermatitis, the injection of leprolin produces, within 24 hours, a moderate general and local reaction at the site of injection but does not produce any modification in the pre-existent lesions

"On the strength of these experiences the author suggests the use of the subcutaneous injection of 1 or 1.50 cc. of leprolin, as a diagnostic test between tuberculoid leprosy and other dermatoses, particularly those of tuberculoid nature such as Boeck's sarcoida.

HASELTERE (H E.) The U.S. Marine Hospital (National Leprosarium) Carville, La. Review of the More Important Activities for the Fiscal Year ended June 30, 1938.—*Public Health Rep* 1939. Nov 18 Vol. 53 No 48 pp 2025-2037

This report gives an account of the many activities at the well-equipped U.S.A. settlement on the usual lines, for the year ending June 30th 1938. The total patients were reduced from 365 to 349 with 75 discharges against 59 admissions and 36 deaths. Returned absconded patients numbered 17. Nearly all the patients received treatment mostly by benzocaine-chaulmoogra oil intramuscularly, and hydriocarpate esters. A satisfactory amount of improvement was observed except on the older advanced cases, a number of whom showed retrogression. New treatments were tried without any noteworthy results. Much laboratory dental, orthopaedic and neuropsychiatric work was carried out. The farm and dairy work effected a useful saving

L. Rogers

DA SILVA (Oliveo Landares) Tratamento das localizações leprosmas nas vias aéreas superiores e na bocca. [Treatment of Leprotic Lesions of the Mouth and Upper Respiratory Tract.]—*Rev Brasileira Leprologia* S Paulo 1939 Mar Vol. 7 No 1 pp. 75-84 With 6 figs. on 2 plates. English summary

The lesions dealt with are congestion dryness and localized lepromata of the mouth, pharynx, nose and larynx and the treatment recommended is, in the first place application of 30 per cent. chaulmoogra in

olive oil every other day. If as was not uncommon this resulted in bleeding the author applied 50 per cent. trichloroacetic acid after the chaulmoogra once a week. If there are definite lepromata he is in favour of galvano-cautery or of cauterization of the wound after excision of the tumour. For laryngeal lesions if there is dyspnoea tracheotomy is recommended, but the average length of survival thereafter was only a year. H H S

VIGNE (Paul) VIGNOLI BONNET (R.) & TIVOLLIER. *Maladie de Hansen cicatrisation rapide d'ulcérations trophiques par l'huile de chaulmoogra nitrée.* [*Chaulmoogra Treatment of Ulcers.*].—*Marseille Méd.* 1933. Oct. 5-15 Vol. 75 Nos 28-29 pp 385-388

A nitrated chaulmoogra oil has been prepared with a view to diminishing the acidity of the commercial oils of from 15 to 20 per cent. of acidity expressed as oleic acid, to about 1 per cent. Several heterogeneous substances are also removed from the oil in the process of treating it with nitric acid. The resulting preparation is dissolved in a fatty excipient for injection subcutaneously and put up in ampoules which can be sterilized in an autoclave at 120°C for twenty minutes. It proved to be non toxic to guineapigs in 3 cc. doses.

An old nodular case of leprosy was treated with 1 cc. intramuscular injections concurrently with those of novarsenobenzol on account of a positive Wassermann reaction. At the end of two months material improvement occurred so the case is recorded to allow others to try this method. L. R.

TISSEUIL (J.) *Action thérapeutique comparée par voies veineuse intramusculaire et intradermique des huiles et des éthyl-esters de chaulmoogra dans les lèpres tuberculoides.* [*Treatment of Tuberculoid Cases with Ethyl Esters of Chaulmoogra.*].—*Bull Soc Path Exot* 1939 Feb. 8. Vol. 32. No. 2. pp 202-207

The author reports good results from the treatment of tuberculoid lesions by the intradermal method with the oils or esters of chaulmoogra and gorli seeds but not with the soaps of gorli and esters of olive oil. Intravenous and intramuscular injection were much slower in their action. L. R.

TISSEUIL (J.) & RIVOALEN (P.) *Action de dérivés du beurre de Gorli éther éthylique des glycérides solides glycérides liquides insaponifiables en injection intradermique au niveau des taches tuberculoides.* [*Gorli Preparation Treatment.*].—*Bull Soc Path Exot* 1933. Nov. 9 Vol. 31 No. 9 pp 819-824

This paper reports on the use of preparations made from gorli seeds. Gorli butter mixed with 40 per cent. of olive oil had a good action on tuberculoid lesions and so had the solid and fluid glycerides but the unsaponifiable fractions were inactive. For the methods of making the various preparations used the original paper should be consulted. The injected skin areas showed an intense black discolouration, but this rapidly disappeared with the subsidence of the infiltration of the lesions. L. R.

TISSEUT (J) & GUILHAUMOU (F) Action de l'huile de ricin de l'huile de foie de morue du bleu de méthylène en solution à 1% en injections intradermiques dans le traitement des taches tuberculoides. [Action of Castor and Cod Liver Oil and Methylene Blue.]—*Bull Soc Path Exot.* 1938. Dec. 14 Vol. 31 No 10 pp. 900-904

The authors report on the action of the glycerides of certain fatty acids. Weekly injections into tubercloid lesions of the skin caused darkening of the patches but had no lasting beneficial effects. Similar preparations made from cod liver oil produced reactions in the injected lesions but after the inflammatory infiltration subsided the treated patches reverted to their former condition. They also tried intradermal injections of 1 per cent. methylene blue but here again they obtained no beneficial effects. L. R.

VELDS (M) Phenolroodtherapie bij lepra. 'Phanol Red in Leprosy'—*Geneesk Tijdschr v Nederl Indië* 1939 Feb 21 Vol. 79 No 8. pp 463-465 English summary (7 lines)

In connection with published favourable results with phenol-sulphonepthalein in two leper patients, this dye was given in sixteen patients at the Poelau di Tjanang Leprosarium however without any success or resulting improvement on the contrary a slow increase could be stated in five patients.

"In consequence this dye just like methylene blue does not seem to be a specific drug for leprosy

RADXA (R.) Contribution à la question du traitement de la lèpre. (Première note) Treatment of Leprosy.—*Ann. Soc. Belge de Méd Trop* 1938 June 30 Vol. 18. No 2 pp 225-232.

This is a report on combined treatment by vaccines of Loewenstein's cultures of what he believes to be Hansen's bacillus together with the chaulmoogra preparations alepol or graumanvi. This gave better results than either method used alone. Tables show that in 118 cases treated for a year 31.66 per cent were free from symptoms and from lepra bacilli, and 44.66 per cent were greatly improved. L. R.

MALAIHOLLO (J. F.) Beknopt verslag van de behandeling van leprozen met het anti-lepraseraum van Prof. Reenstierma te Semarang. [Treatment of Lepers with Reenstierma Serum.]—*Geneesk. Tijdschr v Nederl Indië* 1939 Mar 7 Vol. 79 No 10 pp 601-618

The two bacilli used for the production of the serum were a strain with variably acid-fast character isolated by KEDROWSKI in 1900 from a leproma and a similar strain isolated by REENSTIERMA from the blood of a leper in 1912. Mixed bacillon cultures were injected subcutaneously in the sheep to obtain the antiserum. Altogether 30 lepers have been treated and all chaulmoogra medication was stopped for at least one month before serum injections were begun. These injections in a dose of 10 cc were given intramuscularly in one or more series three weekly. No important bad effects resulted from the injections.

Thirteen of the patients were under close daily observation for two months and a record made of results.—(1) Lepromata and infiltrates—no effect. (2) Skin discolouration—gradual return to normal in two patients. (3) Nasal symptoms—improvement in practically all

patients within a few days but of little permanency (4) Leprosy ulcers—superficial ulcers disappeared in a few days more extensive ulcers healing in one case. (5) Anaesthesiae—restoration of sensation where the neuritis had not existed too long (6) Anaesthetic maculae—some improved but most showed no change. (7) Pareses—significant improvement in two cases. (8) Trophic ulcers—no effect and so on

W F Harvey

MARIE-SUZANNE. L'huile de calophyllum dans le traitement de la lèpre. [Treatment with Oil of Calophyllum.]—*Rev Méd et Hyg Trop* 1938 Sept-Oct Vol 30 No 5 p 271

This brief note refers to the use of calophyllum or dilo oil by Dr NEFF in Fiji for the relief of the pains of neural leprosy and adds that a source of supply of the oil which will be tested has been found in Indo-China.

L R

FÉROV (Jean) Le traitement de la lèpre à la léproserie Saint Antoine à Harrar (Ethiopie) [Treatment at Harrar]—*Rev Méd et Hyg Trop* 1938. Sept-Oct. Vol 30 No 5 pp 261-264

The author claims very good results from the use of a copper compound he calls zymbil-cuivre This appears to be a very finely divided colloidal copper the precise method of preparing which is not disclosed but it is non-toxic can be sterilized and is dissolved in an aqueous non ionizable cinnamic ether It is said to have cured 100 per cent. of macular and 50 per cent of nodular cases and arrested the evolution of the remainder It is also claimed to be effective in grave ocular complications.

L R

VISHNEVSKY (A. A.) Jr Novocaine Blockade in the Treatment of Leprosy—*Internal Jt Leprosy* Manila. 1938 Oct-Dec Vol. 6 No 4 pp 477-490 With 4 text figs & 9 figs. on 1 plate.

This method of treatment is based on the beneficial influence of anaesthetics on an acute inflammatory process reported by SPIES in 1901 One method of use is the blockage of the sympathetic system in the lumbar region and the adjoining part of cerebrospinal nerves. A second is circular blockage of the extremity completely interrupting its innervation Illustrations show the injection in the lumbar region of 150 to 200 cc of 0.25 per cent novocaine with two drops of adrenalin per 100 cc. Similar amounts are injected into the subcutaneous tissues around an extremity In a group of 50 cases local leprous patches and nodules are said to have been resolved and ulcers healed. In another group restoration of sensibility and motor capacity was observed and diagrams of the improvement in the sensory condition are given. In a third group lepra reactions were aborted.

L R

CHOWHAN (J S) & CHOPRA (R. N) The Use of Cobra Venom in Nerve Leprosy—*Indian Med Gaz* 1938. Dec. Vol. 73 No 12. pp 720-725 [18 refs.]

The authors point out that in India about 75 per cent of leprosy cases are of the nerve type with symptoms of neuritis. The injections

of cobra venom relieve the symptoms in a large number of patients. The power of the venom to destroy newly formed tissues is discussed, and it is said that in tissue cultures such destruction may be brought about. Trials of cobra venom together with the vitamin B complex are advocated in nerve leprosy. L. R.

VILLILA (Gilberto G.) Ueber die Beeinflussung der Lepra durch Vitamin B₁ und C (Aneurin und Ascorbinsäure) [Vitamins B₁ and C in Treatment.]—*Arch. f. Schiffs u. Trop. Hyg.* 1939 Mar Vol. 43 No. 3 pp. 127-129

The author reports that 1 to 2 milligrammes of Vitamin B₁ intramuscularly are beneficial in the treatment of nerve leprosy pama. It also has a general effect in all cases on the weight of the patients. Injection of aneurin decreases the blood sugar and cholesterol. In dermal cases vitamin C has no direct effect but may aid the action of chaulmoogra treatment and vitamin B₁ has a similar effect. L. R.

GATTI (Carlos) & GAONA (R. Jiménez) Cebion bei der Lepra Behandlung [Cebion Treatment.]—*Arch. f. Schiffs u. Trop. Hyg.* 1939 Jan. Vol. 43 No. 1 pp. 32-33

Two cases of leprosy one in a septicaemic stage and the other with numerous abscesses, have been treated with Cebion in addition to chaulmoogra preparations with beneficial results. L. R.

UGARRIZA (Ricardo G.) Cebion bei der Behandlung von lepröser Septicaemie. [Cebion in Leprosy Septicaemia.]—*Arch. f. Schiffs u. Trop. Hyg.* 1939 Jan. Vol. 43 No. 1 pp. 33-34

A patient while under chaulmoogra treatment developed a septicaemic fever of three months duration, and laboratory tests gave negative results for typhoid and malaria. Oral tablets of cebion were followed by a decline of the fever in three days with improvement in the condition of the patient. L. R.

CLERCKX Le traitement de la lèpre par le chaulmoograte de diéthylamine Quelques observations [Treatment by Diethylamine Chaulmoograte.]—*Ann. Soc. Belge de Méd. Trop.* 1938. Sept. 30 Vol. 18. No. 3 pp. 373-376

Brief notes are given of fifteen patients treated by painless intravenous injections twice a week with from $\frac{1}{2}$ to 2 cc. doses of diethylamine chaulmoograte. Most of the cases showed general improvement and healing of ulcers took place. The effect was not so good on macules, and when they disappeared they tended to return after two months. L. R.

KHAM (Joseph S.) Treatment of Leprous Trophic Ulcers.—*Leprosy in India* 1939 Jan. Vol. 11 No. 1 pp. 19-21

The author reports good results from the removal of dead bone, etc. from chronic ulcers and then affording rest and protection from pressure by the application of plaster of Paris, and the local use of two per cent. acriflavine or of gauze. L. R.

MAYNARD (N. H.) The Treatment of Trophic Ulcers in Leprosy —
East African Med J 1938 Dec Vol. 15 No 9 p. 307

This worker advises removal of carious bone and trimming the dead skin back to the level of the base of the ulcer followed by antiseptic dressings of 1-1000 perchloride of mercury to clean the ulcers. She then fills the ulcer with a warmed mixture of an ointment composed of beef suet 2 parts, ghee (melted butter) 1 part and beeswax $\frac{1}{2}$ part and covering with cotton wool and a sewn on bandage. The application is renewed every third day for the first two weeks, and then once a week. Of 60 cases 50 healed within six months. L. R.

DE GOLDFIEM (Alice S.) & DE GOLDFIEM (Jean S.) La phytothérapie de la lèpre [The Phytotherapy of Leprosy]—*Rev Méd et Hyg Trop* 1938 Sept-Oct Vol. 30 No 5 pp 272-282.

This note gives a list of the trees furnishing oils with the composition of chaulmoogra. Some references to the literature of their chemistry are also quoted. L. R.

VELDS (M.) Welke therapie bij lepra? [Treatment of Leprosy]—*Geneesk Tijdschr v Nederl Indië* 1938, Dec 13 Vol. 78, No 50 pp 3152-3164 With 11 figs. on 2 plates. English summary

BENCHETRIT (A.) Comentarios al segundo centenar de enfermos de lepra curados bajo la dirección del Dr. A. Benchetrít, en el Lazareto de Agua de Dios. [A Second Series of One Hundred Lepers treated in Agua de Dios.]—184 pp With numerous illustrations. 1938. Bogota. Editorial Minerva, S.A.

FABRE (Maurice) Le traitement de la lèpre par des injections associées d'huile de chaulmoogra et de bleu de méthylène. [Chaulmoogra and Methylene Blue Treatment.]—*Rev Méd et Hyg Trop* 1938 Sept-Oct Vol. 30 No. 5 pp 249-252.

BURCHKES (K.) Flacourtiaceenöl und ihre Derivate [Flacourtiaceae Oils and their Derivatives]—Reprinted from *Angewandte Chemie* 1938, Vol. 51 p 772.

DE BRAUWERE (P.) Vues d'ensemble sur la situation de la maladie du sommeil et de la lèpre dans les territoires sous l'action du Foréami durant l'année 1938 [Sleeping Sickness and Leprosy in the Areas controlled by the Foréami during 1938.]—*Ann Soc Belg de Méd Trop* 1938, Sept 30 Vol. 18 No. 3 pp 381-418

This note records figures of leprosy incidence in a part of the lower Congo. The author advocates treatment with chaulmoogra esters and Perier's gynocardate of soda and village segregation with agricultural employment. L. R.

KEIL (Ernst) Lepra und Erbfaktoren [Heredity in Leprosy]—*Arch f Schiffs u Trop Hyg* 1939 Mar Vol. 43 No 3 pp 95-102. With 10 figs. [16 refs.]

The author discusses the predisposing action of heredity in leprosy. He mentions five sets of twins with both infected in two of them and in another group of cases one of two sets of twins showed both attacked by leprosy. L. R.

BUXOT (Et.) Examen de quelques réactions d'immunité et d'allergie dans la lèpre murine [Reactions of Immunity and Allergy in Rat Leprosy].—*Arch Inst. Pasteur de Tunis* 1938. Dec. Vol. 27 No. 4 pp 360-367

The results of repeated inoculations of rats and mice with Stéfansky's bacillus are recorded. When rats are re-inoculated after an interval of six to eight months nothing of the nature of Koch's phenomenon in tuberculosis is seen. In the case of mice a tendency to abscess formation is observed after re-inoculation. With repeated re-inoculations at short intervals some degree of increased sensibility was noted but not a specific allergy. Re-inoculations into the peritoneal cavity after two to six months produced in rats a very feeble and brief phagocytosis as compared with that in mice for the leucocytes and reticulo-endothelial system do not in rats fix the bacilli in the way they do in mice. Further development of the bacilli in rats is mostly in the interstitial tissues and in mice it is more intracellular in nature.

L. R.

MARCHOUX (E.) & CHOKINE (V.) Le phénomène de Koch ne se produit pas chez le rat par réinoculation du bacille de Stéfansky. The Failure of the Bacillus of Stéfansky to produce the Koch Phenomenon in the Rat.—*Bull Soc Path Exot* 1938. Nov. 9. Vol. 31 No. 9 pp 809-815

These workers also found that the phenomenon that Koch described following the re-inoculation of tubercle bacilli into an animal does not occur on the re-inoculation of Stéfansky's rat leprosy bacillus. Instead a fresh infection results that aggravates the former one. Nor does the injection of masses of the rat bacillus provoke any signs of intoxication. We may therefore suppose that in the case of human leprosy superinfections may take place.

L. R.

PRUD'HOMME (R. O.) Conservation du bacille de la lèpre du rat dans un milieu où pousse le bacille de la fièvre [Preservation of the Rat Leprosy Bacillus in a Medium in which *Mycobacterium* is growing].—*Bull Soc Path Exot* 1938. Nov. 9. Vol. 31 No. 9 pp 815-818

The author reports that he has succeeded in preserving the virulence of Stéfansky's bacillus for seven months at 37°C. in Sauton's medium adjusted to pH 6.5. At room temperature they did not survive more than forty days.

L. R.

GAVRILOV (V.) DUBOIS (A.) & FESTER. L'infection expérimentale du rat par le bacille de Stéfanski observée en Belgique. [Experimental Rat Leprosy Infection in Belgium].—*Internat J Leprosy Malaria* 1938. Oct.-Dec. Vol. 6 No. 4 pp. 515-528. With 12 figs on 3 plates

These workers report that they obtained small colonies of Stéfansky's bacillus on Denys's medium and on potatoes up to the fifth transfer. The pathogenicity could only be maintained with difficulty and not very characteristically. They think geographical conditions may affect the results.

L. R.

LYON (M) Le rat ne réagit pas à la léproline de Mitsuda. (Leprolin Reactions in Rats.)—*Bull Soc Path Exot* 1939 Feb 8. Vol. 32. No 2. pp 134-136

The intradermic injection of Mitsuda's leproline prepared from Stéfansky's bacillus gives negative results in both healthy and infected rats
L R

PRUD'HOMME (R. O) Préparation d'une émulsion de bacilles de Stéfansky à partir d'un léprome et évaluation de sa richesse [Preparation of Rat Leprosy Bacillus Emulsions.]—*Bull Soc Path Exot* 1939 Feb 8. Vol. 32. No. 2. pp 136-139 With 1 fig

PRUD'HOMME (R. O) Action du bacille de Stéfansky sur certains acides aminés *in vitro* [Action of Stéfansky's Bacillus on Amines.]—*Bull Soc Path Exot* 1939 Feb 8 Vol. 32. No 2 pp 138-141

REVIEWS AND NOTICES

BAXERJEA (J C.) [M.B (Cal.) M.R.C.P (Lond.) etc.] & BHATTACHARYA (P. B.) [M.B. D.T.M (Cal.) Bengal Medical Service Upper etc.] *A Handbook of Tropical Diseases with Treatment and Prescriptions.* Second Edition Thoroughly Revised Re-Written Enlarged & Brought Up-to-Date—pp x+413 With 1 plate & 22 figs. (13 coloured) 1938. Calcutta U N Dhur & Co 15 College Square [Rs. 7-8-0 Cash price in Great Britain 15s.]

The preface to this book expresses the hope that it will prove helpful to senior medical students in their final examination and to practitioners, and that all unnecessary theoretical details have been avoided. These statements explain the fact that the text consists largely of long numbered lists of symptoms and points of differential diagnosis with very little indication of their relative importance. The contents are also noteworthy for important diseases occurring in other tropical countries than India are omitted such as yellow fever and trypanosomiasis as well as others that do occur to some extent in India including undulant fever yaws tropical ulcer inguinal ulcerative granuloma madura foot and lymphogranuloma. On the other hand smallpox and typhoid fever which are very prevalent in India are included with advantage to the Indian student. Under filariasis only the conditions produced by *B. bancrofti* are dealt with. Lathyrism and pellagra as well as schistosomiasis are also omitted.

Malaria rightly occupies one of the longest chapters and appears to follow very closely in an abridged form Sir John Megaw's article in Rogers and Megaw's *Tropical Medicine*. Long lists of points in differential diagnosis involve repetition and in some instances appear to be over-elaborated. Kala azar for example hardly requires separate lists of symptoms for its differentiation from acute miliary tuberculosis and Hodgkin's disease. Malaria is differentiated from pneumonia but not from dengue with which it was for a long time confused.

Many of the chapters contain much detailed information nearly all of a clinical form for pathological details are scantily dealt with. Under cholera for example no information is given on the recent

work on the value of the O antigen in identifying the true causative organism. In the differentiation of cholera from agud malaria the practical point of the low sp. gr. of the blood in malaria due to anaemia is not mentioned. In its treatment morphia is advised for the relief of cramps although they disappear rapidly following saline infusions and the drug greatly predisposes to uraemia. The description of amoebic dysentery is useful but the date of the discovery of the value of emetine is twice given as 1902 in place of 1912. Amoebic hepatitis and liver abscess are dismissed in the altogether inadequate space of one page. The chapter on leprosy is a good one. Under sprue atrophy of the mucous membrane is emphasized, although recent observations made on fresh post mortems discount its occurrence. Under epidemic dropsy Sir John Megaw's important work is not mentioned. Under snake poisoning permanganates are said to oxidise the venoms evidently a misprint for oxidize but such misprints are few.

There are very few illustrations and the magnifications of the microscopical illustrations are not given. The index consists of the main sub-divisions of the articles under each chapter with no cross references. It is of very little use. The ten pages of prescriptions deal much more with common diseases of all kinds than with tropical ones. They include mixtures for asthma, bronchitis, conjunctivitis, cough, earache, various common skin diseases, epilepsy, insomnia, lumbago etc.

The general character of this book can be gathered from the above account of its contents. It cannot be recommended as a text-book of tropical medicine but it contains a lot of tabulated facts and guides to treatment regarding the limited range of subjects it deals with, that should fulfil its avowed purpose as a help to senior students in preparing for examinations.

L. Rogers

DUMAS (J.) [Chef de service à l'Institut Pasteur]. La dysenterie bacillaire. [Bacillary Dysentery]—89 pp. With 1 plate. [Bibliography] 1938. Paris. G. Doin & Cie. 8 Place de l'Odéon. [28 fr.]

Bacillary dysentery is an important disease which suffers singularly from neglect in most text-books, so that any contribution to its more general understanding should be welcomed. The present brochure to some extent fills this gap as it entails a good general, but by no means profound, study of the disease nor can it be termed exhaustive for there are several aspects, notably bacteriological, which are somewhat sketchy and there are of course statements to which exception can be taken. It is surely untrue, for instance, to state (p. 12) that "*Amoeba histolytica* was discovered by Schaudinn in 1902".

In considering epidemiology great importance is attached to the continued existence of dysentery bacilli in the soil, but no reference is made to carriers, contaminated water or to flies as important factors in the spread of the disease.

A curious omission is that no mention is made of Sonne dysentery and this is all the more regretted because the symptomatology of Shiga and Flexner dysenteries are given separate consideration, on the assumption that they can be distinguished clinically but, at the same time, Dumas states that, in all but the very acute and

fulminating cases, differential diagnosis from *Amoebic dysentery* is difficult if not impossible to make, for the signs and symptoms of the two diseases are identical and the doctor divorced from the laboratory can do so only as the result of observing the effects of emetine therapy. A further statement which will not gain general acceptance is that as a general rule agglutination tests with the patient's serum are of great importance in diagnosis. The pathology is based upon the classical description of Ch. Dopter.

In the description of complications considerable importance is attached to perforation of the colon causing general peritonitis, to the adrenal syndrome and also to a kind of poliomyelitis 'Paralyses dysenteriques' which is not generally referred to in the text books.

The value of treatment by antidyenteric serum is emphasized and the practical effects of bacteriophage therapy discounted.

From a general standpoint this contribution to bacillary dysentery can hardly be considered international, for references to English American and workers of other nationalities who made such important war time contributions to bacillary dysentery are singularly neglected. The one exception is Broughton Alcock who is referred to as Broughton & Alcock. There are it is true 133 references confined almost entirely to French writers. One illustration a photographic reproduction of a bacillary dysentery bowel enlightens this work.

P. H. Manson Bahr

PURCELL (F. M.) [M.D. (Dublin University) M.R.C.P. (Ireland)
D.T.M. & H. (London) Colonial Medical Service Gold Coast]
Diet and Ill-Health in the Forest Country of the Gold Coast—
pp viii+77 With 62 figs 1939 London H. K. Lewis & Co
Ltd. [7s 6d]

Dr Purcell has undertaken a difficult task—to give an account of the physical condition of the people of a country district in West Africa of their diet and food-habits and of the morbid conditions associated with or due to malnutrition—on a purely clinical basis. His undertaking is made all the harder because he has no personal laboratory or experimental investigations to support his theses and for figures of food analyses has had to rely on others.

The author has divided the account into two sections the first deals with the people of Akum living in a forest district to the south of the Gold Coast Colony and their diet the second with the many clinical syndromes which he considers attributable to malnutrition.

The average height of a male adult is 5 ft. 4 in. the female about 4 inches less and their general physique is poor as compared with the tribes of the Northern Territories. Their diet is mainly vegetable meat is a scarcity and fish far from plentiful and is mostly imported salted or smoked the local supply being insignificant. A list of the available foods is given and it is shown that though the total calorie value is high the fats and protein constituents are low. Children at the school appear to be in good health though the diet comprises mainly plantain cocoyam and cassava little fruit and no meat. Even nursing mothers have only 30–50 gm. of protein daily and that of low quality and only 10 gm. of animal origin and 30 gm. fat 5 gm. only of animal fat. It is probable, seeing that the children in many cases appear well that they have adapted themselves to their diet but that they live on the borderline as it were and any stress or infection breaks

down the reserve of resistance. The fertility rate is high—6.9 children per mother—but infant mortality is also high—some 20 per cent in the first year and 43 per cent in seven years.

The second section though highly interesting is not very satisfying for the findings, as stated above are purely clinical and unsupported by any laboratory or experimental work. This is not the fault of the author for he had no laboratory and he was probably too busy to undertake experimental investigations. Nevertheless the fact remains that a large number of conditions are described and too many subdivisions made of the small total of 210 cases. The conditions detailed are ascribed to defective nutrition because they occur among poor class natives whose diet is unbalanced, because similar diseases have been described by others and ascribed to faulty nutrition and because improvement occurs when the patients are given a nourishing diet. These reasons are not very satisfying. *ankylostomiasis* is common among poor class natives and leprosy will improve before any specific treatment is given, when a nourishing diet is taken but these are not therefore ascribed to malnutrition.

Dr Purcell divides his cases into four main clinical groups: (1) With alimentary symptoms predominating followed in some by oedema in others by dermatitis. (2) Dermatitis cases without preliminary alimentary disturbance. (3) Oedema cases. (4) Nervous disorders. Alimentary symptoms cover a fairly wide range and include stomatitis, glossitis, bad dentition, bleeding gums, ulceration of the buccal mucosa and others. Oedema may or may not be accompanied by albuminuria; the latter are regarded as nephrotic or nephritic and may terminate by acute pulmonary oedema. Diarrhoea is commonly present also. It is found often in children who are still being breast fed though the mother is again pregnant the nursing being supplemented by scraps. Even at the best of times the mother's milk is of poor quality and tinned milk is better. Among the conditions characterized by dermatitis the author describes *kwashiorkor* [see this *Bulletin*, 1934 Vol 31 p 344, 1936 Vol 33 pp 410 and 734] first recorded by Dr Cicely WILLIAMS in the Gold Coast, but shows that in the same (or very closely similar) conditions described by himself maize cannot be incriminated. The pathology he does not describe and the pathogeny he regards as obscure and wisely refrains from attempting to explain it. He discusses Clarke's theory of pellagra being due to chronic prussic acid poisoning without stopping to consider whether there is any evidence that chronic HCN poisoning does occur (apart from its supposed action in causing pellagroid symptoms).

Under the heading of Nervous disorders is a very mixed bag. It includes those who are merely apathetic or emotional with fits of temper, those backward in or showing reluctance to walking, those exhibiting a sudaminal rash and head sweating. Some resemble markedly cases of *Foer's acrodynia*.

In the category of skin disorders are included cases of atrophy and eczema, dermatitis and pigmentation, *ecthyma* and ulcers the result of scratching.

Regarding treatment the author has little to say. Most of the patients were extern and treatment of any kind he found of little avail. He recommends on general lines a better diet with more meat, supply of tinned milk, retaining of red rice in place of the present method of

selling it and buying milled rice and so on and further analyses are needed and study by biochemists as well as clinicians.

The work is well illustrated and the original photographs must have been exceptionally good to bear so much reduction. Rashes and eruptions rarely show well in uncoloured photographs and when reduced to the size of a postage stamp as some of these photographs are they are really wasted and many are too dark to show much others however are very good. The whole would be improved by addition of an index.

H H S

WIGGLESWORTH (V B) [M.A. M.D. F.R.S. Reader in Entomology in the London School of Hygiene and Tropical Medicine] *The Principles of Insect Physiology*—pp viii+434 With 316 figs 1939 London Methuen & Co Ltd 36 Essex Street W.C.2. [30s.]

Dr Wigglesworth has produced a general account of the physiology of insects in which he deals with development and growth and the various systems such as the integument muscles and the organs of digestion respiration and reproduction there are also chapters on the central nervous system sense organs and the behaviour of insects. The book is fully illustrated with line drawings many of them from the author's own papers in which he has already made important contributions to many sides of insect physiology.

To readers of this *Bulletin* the significance of this book is that nearly every problem in the control of insects makes an intelligent person look for information on their physiology. For instance one could hardly use an insecticidal method (such as fumigation or poisoned baits) without having a general knowledge of the functions of an insect and particularly of its respiration or digestion and it is not only in controlling insects but also in studying the epidemiology of certain diseases that one meets riddles which the physiologist alone can answer. Why is it that rat fleas are rare in hot dry weather? Because their larvae not the fleas themselves are inadequately protected against loss of water through the tracheal system. Or why is it that malaria is so much more grave in one part of a country than another? The immediate answer depends on the local distribution of particular species of *Anopheles* penetrating the subject more deeply one frequently finds that that in turn hangs upon some point of larval physiology such as a need for calcium or an ability to extract traces of salt from natural pure waters. One cannot pretend that insect physiology will answer all our riddles but it has already explained some of them and it gives us a necessary background of knowledge.

A man concerned in controlling insects might perhaps find particular value in the chapter which deals with behaviour for he will realize that insects' behaviour is rigid and predictable at least in some directions and he may use this knowledge to avoid damage or achieve cheap control. It is exceedingly difficult for us to understand the behaviour of insects for their whole organization and the structure and position of their sense organs are so different from our own some insects can perceive ultra violet radiation carbon dioxide and water vapour so that they must live in a perceptual world very different from ours. It has therefore been a difficult matter to devise experiments sufficiently critical and subtle. But as this book shows

much progress has been made and we may now begin to understand what it is that keeps an insect active or at rest and to recognize some of the stimuli which direct its movements or bring it to places where it feeds or lays its eggs.

Readers of this *Bulletin* may be proud to notice the extent to which medical workers have developed the science of insect physiology

P. A. Buxton.

MACKENNA (Robert M. B.) [B.A. M.D., B.Ch.(Camb) M.R.C.P (Lond) etc.] *Aids to Dermatology and Venereal Disease*. Second Edition.—pp. vii+284 With 7 figs. 1939 London Baillière Tindall & Cox, 7 & 8 Henrietta Street Covent Garden WC 2. [4s. 6d.]

The Students Aid Series comprise small volumes which can easily be slipped into an ordinary jacket pocket. It is therefore absolutely impossible for any one of the books to deal exhaustively with its subject. They are not text-books but "reminders." At the same time this particular member of the group does contrive to contain a remarkable amount of accurate information. It must be realized that the mere fact that a patient happens to live in the tropics does not prevent him from suffering from an "ordinary" dermatosis for sight of this fact is apt to be lost in the luxuriance of the diseases more peculiar to the tropics. These latter do not of course occupy much space in this volume but some reference is made to the most important of them. The section on venereal diseases gives an excellent summary of the modern methods of treatment and is absolutely up to date

Sydney Thomson.

HENRY LESTER INSTITUTE OF MEDICAL RESEARCH (SHANGHAI CHINA) *Annual Report 1937-1938*.—90 pp With 2 plates.

This Report covers the work of two years and summarizes the considerable amount of work carried out, much of which has been abstracted in this *Bulletin*. Deficiency diseases nutrition the study of certain helminths and investigations in malaria and in the transmission of filariasis and relapsing fever are of interest to readers of this *Bulletin*. The long lists of papers published testify to the energy and enthusiasm of the staff under the disturbed and trying conditions which have recently existed.

C W

TROPICAL DISEASES BULLETIN.

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[No 9

SUMMARY OF RECENT ABSTRACTS

VII HELMINTHIASIS *

[continued from p 616.]

Ankylostomiasis —KANDELARI and KAMALOV (p 671) find heavy hookworm infection in Western Georgia, Russia especially in districts of heavy rainfall. In one series 92 per cent. of the hookworms recovered after treatment proved to be *N. americanus* the remainder were *A. duodenale*.

SCOTT (p 273) estimates that of the twelve million rural inhabitants of Egypt about five million are infected with hookworm. In some villages the infection rate reaches 90 per cent. He details the techniques used in the investigation made and considers that estimations of worm burdens from egg count figures cannot usefully be made on account of the large errors involved. But he concludes that in general where a high proportion of infected persons is found there is a large number of worms in each infected person. He also (p 274) discusses soil pollution in Egypt. It is common throughout the villages and in the fields but possibly on account of dryness or excess of chlorides or some associated factor the fine clay soils do not serve as good media and few larvae can be found. Even when irrigation is carried out the moisture content often falls fairly low and the hot sun may kill the larvae. Defaecation is scattered but, near water soil infestation is widespread though seldom intense. These observations harmonize with the widespread but low grade human infection found.

KELLER *et al* (p 274) report that in comparison with investigations made by the Rockefeller Sanitary Commission in 1910-1914 their recent findings show a reduction in hookworm infection of between 33.7 per cent. and 27.3 per cent. in five of the United States. The peak incidence is between 15 and 19 years and family infection is important. LANE states that the value of the comparison depends upon whether the techniques in the earlier and later investigations were identical and that according to Stoll whose method they used,

The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1938 Vol. 35. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

the amount of faeces examined by the authors was not enough for the detection of single worms.

PESQUERA and PASCALE (p. 276) examined 1 177 school-children by the Stoll Hamsher technique in São Paulo and found 75.4 per cent. to be infected with *Necator*. A rather higher percentage was found in those living in houses not provided with latrines than in those so equipped.

WEBB (p. 217) by systematic measurements of all hookworm-like eggs in the faeces of patients in Mauritius found 8 per cent. *Trichostrongylus*, 0.9 per cent. *Terridens dominicus* and 0.9 per cent. *Ancylostoma braziliense*-like eggs. He records a patient infected with *Trichostrongylus axei* normally a parasite of equines.

TAYLOR (p. 670) stores nematode larvae between damp filter papers in a sealed petri dish at 36°-40°C. After a year 91 per cent. of the larvae are alive. RUDOLFS (p. 672) cites unpublished evidence that a small percentage of hookworm eggs may survive sludge digestion under certain conditions. In Singapore effective destruction is ensured by heating digested sludge to 150°F. or more for at least 30 minutes.

CIMINO (p. 276) lays stress on the value of dark blue pigmentation of the tongue as a diagnostic sign of ankylostomiasis, but LARX points out that this sign has been discredited for more than 30 years. MINAMIZAKI (p. 672) shows that hookworm eggs appeared in the faeces 58 days after deliberately walking barefoot over farm land. Treatment failed to eliminate all worms, and eggs persisted for 7 years. BONNE (p. 277) describes five cases in which hookworms were found in the submucosa of the intestine. In three instances eggs and larvae were also present and in one there was destruction of the circular muscle coat. He believes that the worms were *A. braziliense*. GARIN (p. 673) records a patient from whom 302 hookworms were removed, who showed no symptoms although some anaemia was present.

LANDSBERG (p. 279) from experiments in dogs infected with *A. caninum* shows that there is a progressive increase in reticulocytes corresponding with the progressive decrease in erythrocytes and haemoglobin, without any evidence of haemolysis. This was also found in normal dogs subjected to successive bleedings and the results do not support the theory that inhibition of bone marrow activity through toxic action takes place but rather that hookworm anaemia is the result of blood loss. A reduced platelet count is one of the known changes in anaemia due to some poisoning of the bone marrow. No such change was found by LANDSBERG (p. 673) even in fatal *A. caninum* infection of dogs and this provides further evidence against the view that hookworm anaemia is produced by a toxin. Clotting power was not reduced. RYO (p. 278) emphasizes his opinion that hookworm anaemia is due to the continuous blood loss. In experiments on man with *A. duodenale* he found that the time from infection to oviposition was from 54 to 57 days. Eosinophilia became obvious a week after infection, was at its height in 6 to 7 weeks, but decreased after the 15th week. The numerical relationship between the number of worms and the intensity of the anaemia is not recognizable when the worms harboured are less than 50. The blood loss caused by one *A. caninum* experimentally measured, varies enormously with temperature the most favourable being 38°C. to 39°C. and is about 0.38 cc. per diem, but this may be multiplied 4 or 5 times if the worms are very vigorous.

Investigating the oedema of helminthic anaemia SALAH (p 673) found that in 12 of 22 cases there was hypoproteinaemia and 4 others responded to a high protein diet. He therefore suggests that replacement of blood deficiencies is a useful therapeutic measure. SILVEIRA and DE MOURA CAMPOS (p 280) give results of estimations of gaseous interchange in the blood in hookworm anaemia. These cannot be further abstracted.

In the *Lancet* (p 671) it is shown that the use of a poor diagnostic technique will give a high and false rate of cure that floatation gives higher counts than dilution but that DCF is the most accurate method in that it can detect a single normally ovipositing female hookworm and that detection of worms not egg counts must be the basis for evaluating drugs. PESSÔA and PASCALE (p 275) found that examination by the Stoll Hausheer technique detected no relationship between egg counts and hookworms recovered after treatment and that this method cannot be relied upon to detect light infections. PESSÔA (p 674) examines the findings in consecutive stools following treatment and confirms the opinion of MAPLESTONE and MUKERJI that examination of stools for worms for one day only does not give a true picture of the numbers present.

HABERT (p 392) records two patients who developed symptoms suggestive of yellow fever after taking 3 cc. carbon tetrachloride and a third who died with hepatitis of the yellow fever type after taking a dose of the drug [quantity not stated]. DANIELLA and TOURENC (p 675) report two deaths from carbon tetrachloride poisoning which are attributed to the presence of phosgene. PEU DUVALLOX (p 676) advises Didakol, or carbon tetrachloride with chenopodium and chloroform in treatment and ERHARDT (p 676) experimented on cats infected with *A. caninum* by giving various drugs including carbon tetrachloride in doses equivalent to almost 1 oz. for a man. Commenting on these papers LANE points out that no evidence was produced in the first to show that phosgene was the cause of death, and that carbon tetrachloride itself can be lethal in doses ordinarily given that in the second a large dose (4 gm.) of carbon tetrachloride is mixed with 1.5 gm. chloroform the action of which is similar and that in the third the experiments do not apply to man since the large doses killed some of the experimental animals. He makes a plea for a large scale enquiry into the safety and efficiency of anthelmintics.

MAPLESTONE and MUKERJI (p 282) give details of 96 persons treated for hookworm infection by 3 cc of tetrachlorethylene and 1 cc. oil of chenopodium and of 90 treated with 4 cc of tetrachlorethylene. Percentages of real and practical cures with the former were 65.6 and 84.4 after two treatments with the latter 77.7 and 94.4 after three treatments. Faecal examination was carried out by DCF. PESSÔA and PASCALE (p 281) claim that a dose of 4 cc of tetrachlorethylene in gelatin capsules eliminates about 95 per cent of *Necator*. Details of 51 persons treated are given and the results are calculated on findings by the Willis technique. LANE comments that the validity of the conclusions rests on the assumption that the technique is accurate.

SORONDO CAMPANERÍA (p 272) discusses oil of chenopodium. VAN WYMEERSCH (p 676) uses *Entelminutina* a preparation of male fern for ankylostomiasis.

CHAVES (p 674) discussing the value of shoes in the prevention of hookworm infection points out that as children tend to wear them in

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the uncontaminated environment of schools and to discard them in the home environment where contamination is likely comprehensive measures including medication and the use of sanitary latrines are necessary. Shoes have only auxiliary usefulness. COCKRILL (p. 280) shows how ankyllostomiasis has decreased in Fiji following the installation of standard borehole latrines with concrete squatting slabs. Details of the latrines are given. A campaign of education was also conducted.

CHANDLER (p. 350) shows that more larvae of *Nippostrongylus* introduced into already infected rats fail to establish themselves in the intestine than in normal controls, but that there is no evidence of increased retention in skin previously exposed to penetration, although leukocytic infiltration and eosinophilia are increased. Immunization Attempts at passive immunization with serum from rats infected with *Nippostrongylus* has produced little result.

Strongyloides Infection—OSBURN (p. 678) reports 5 cases of *Strongyloides stercoralis* infection. Two showed diarrhoea and severe anaemia probably entirely caused by the infection. SMOKE (p. 677) successfully treated 2 cases infected with *S. stercoralis* with ultraviolet light and gentian violet per os.

Ascaris Infection—HILLER *et al.* (p. 668) show that the incidence of *Ascaris* infection in North Carolina has risen since 1921. The average worm burden in each infected person increases in proportion to the number of infected persons in each family. WINSTED and LEO (p. 271) examined washings from 2745 kilograms of vegetables in China for *Ascaris* eggs without finding any, though eggs were found in the soil of vegetable gardens in 57.1 per cent of 49 samples. They therefore conclude that the contamination of vegetables is not a major source of infection.

SARGENT (p. 272) records the case of a boy in whom a mass of worms in the right iliac fossa caused acute intestinal obstruction which was relieved by enemata. Oil of chenopodium followed by sanftonin brought away 87 worms. Intestinal obstruction was caused by *Ascaris* in the small intestine in 4 children reported by CIRIANO (p. 671). Operations were performed and 2 of the children died 1 of whom had in addition volvulus of the intestine.

BROWN (p. 273) considers that anthelmintics are absorbed through the body wall of *Ascaris* and in this manner rather than by ingestion produce their effect. Delayed death of the worm results from injury of a small portion by the application of an anthelmintic locally.

Filetirosis—TAMAKI (p. 359) reports that there is much infection with *Filetirosis* on Boko Island.

O COXAR and BEATTY (p. 781) in St. Croix found 25.08 per cent. of wild *Culex fatigans* showing infection with larval forms of *Filetirosis*. Only 2.3 per cent showed the infective stage and of those infected the figure of infectivity was 9.1. Infection was highest in July. Larvae in 48 per cent of *Aedes aegypti* were found to be infective did not reach infectivity but development proceeded to maturity in *Anopheles albimanus* and *C. tritaeniorhynchus*. The effective proportion of infective mosquitoes is probably for various reasons, much less than those figures suggest. Measures for reducing human infection are suggested. BROWN (p. 760) in Kabana differentiates between crude

and corrected infection indexes in vectors of *Mf bancrofti*. From the latter category are excluded mosquitoes containing only larvae with very retarded development which if included might give a false impression of their suitability as vectors. Complete development was found in *A barbirostris* *A aconitus* *C fuscocephalus* *C whitmorei* *C fatigans* *C alis* and *rishani* and *C annulirostris*. HU (p 389) shows that *C pipiens pallens* were more frequently and more heavily infected after feeding on a heavily infected patient than on one lightly infected and when the feeding took place at a time when embryos were most numerous in the blood.

ABE (p 389) studied the biological behaviour of freed larvae of *W bancrofti* which had undergone full development in *C fatigans*. The larvae lived longest, 37 to 58 hours when placed in normal saline but were extremely sensitive to drying.

MONTESTRUC and BERTRAND (p 390) report two cases of lymphangitis in one of which streptococci and *Mf bancrofti* were found in an abscess. GORTER (p 391) gives details of the operative treatment of elephantiasis of the legs the results of which have been gratifying and which has ensured a satisfactory lymph flow. For full information the original abstract must be consulted. DE GREEF (p 762) discusses the results of operative treatment of elephantiasis. He considers that in the Congo onchocerciasis may be accompanied by elephantiasis but as LANE points out does not mention the possibility of mixed infection without microfilariae in the blood.

DASSANAYAKE (p 759) reports on an endemic area in Ceylon in which *Mf malayi* is the only filarial larva present. Circumscribed foci are present in villages situated near water tanks containing *Pistia* plants or having many naturally infected *Mansonia*. GALLIARD (p 387) states that although recent investigations in Tonking have shown a higher percentage of microfilariae than were found in 1911 the difference is probably due to the larger amount of blood examined in the later investigations. He also (p 388) reports that in Tonking *Mf malayi* is about twice as common as *Mf bancrofti* but that considerable local variations occur. *W bancrofti* was always the only cause of urogenital lesions but *Mf malayi* was present in 20 per cent. of cases of elephantiasis of the legs. LIU (p 388) found *Mf malayi* in 2 of 80 persons examined in Changsha, Hunan. HU *et al* (p 387) report the finding of *Mf malayi* as well as *Mf bancrofti* in examinations in Foochow where the former had not previously been seen. Five of fifteen *C fatigans* caught in one house were infected. In Borneo KARIADI (p 760) found the highest index of infection in *Mansonia annulifera* (22 per cent.) a domestic mosquito. *M uniformis* and *A barbirostris* are also infected and parasite indexes as high as 32.2 per cent. were found in men in the district examined.

SWEET and PILLAI (p 766) report on the success of the clearing of *Pistia* in lessening the incidence of *Mansonioides* in North Travancore which illustrates the suppression of a mosquito-borne disease by a strictly limited species control of the carrier.

LANE (p 764) discussing filarial periodicity makes a suggestion that charts of microfilaria which would be found if a series of dogs were infected with *Dirofilaria* and if the blood were examined every two hours should be correlated with the number of empty worms to be found in the hearts of the dogs after they had been killed at different hours. In a discussion of the same subject HYMAN (p 385) considers that the theory of simultaneously timed parturition can only be accepted

if the female worms are shown to be capable of producing enough embryos daily to account for the enormous numbers frequently seen and if a comparable destruction of microfilariae occur about midnight. There is no evidence on the second point but on the first he has found in dogs infected with *Dirofilaria immitis* that there is no correlation between the number of worms and the larvae found, the variation being between 10 740 and 3 750,945 per female worm. He cannot conceive it possible that single worms can produce daily the large numbers indicated. He cites an experiment by KNOTT from which it was concluded that embryos can survive in man up to 2 weeks following blood transfusion but LANE criticizes this on the grounds that it was not certainly known that the human volunteer in that experiment had not previously harboured infection unknown to the investigator. HINMAN shows that fertilized female *Dirofilaria immitis* in saline or Ringer solution at 39°C produced the greatest numbers of microfilariae within 6 to 12 hours of introduction into the media irrespective of whether the animal was killed at 7 a.m. or 7 p.m. and that the usual number produced was from 4 000 to 10 000 per worm. Admitting the insufficiencies of this experiment the author considers that if cyclical parturition were the rule in the normal habitat there should have been some indication of it under these experimental conditions. In comment LANE sets out his view that periodicity is due to simultaneous parturition, and that microfilariae in the blood are short lived owing to the action of the reticulo-endothelial cells.

JOYEUX and SAUTET (p 390) have grown *Af. immitis* in a mixture of serum and haemolysed blood from an infected dog. The average period of survival was 12 days and an increase in length of the embryos to 290-442 μ was observed in the first 6 days when measured without being fixed. LANE considers that the absence of such large forms in the blood may be presumptive evidence of rapid destruction in the body. O'CONNOR and BEATTY (p 785) examined the reaction of birds infected with *Vagrofilaria columbigallinae*. No periodicity was seen in the microfilariae present in the blood. In the livers large aggregations of lymphocytes and giant cells were seen surrounding embryos in all stages of degeneration and the whole picture suggested massive death degeneration and absorption going on continually in the organ. LANE points out the importance of this observation in relation to human filariasis.

DE CHOISY (p 762) reports apparent success in the treatment of Loa infections with anthelmintics injected on alternate days. RISHWORTH (p 763) reports a patient from beneath whose conjunctiva a female worm was removed. A second female was found under the skin of the neck. No microfilariae were found in the blood. MAPLESTONE (p 763) examined the worms and regards them as probably belonging to a new species of the genus *Loa*. He suggests the tentative name of *L. inquirenda* but the matter cannot be fully elucidated until a male is found.

STRONG (p 767) considers that in onchocerciasis the nodules do not represent the place which the flies have bitten but are probably found where lymphatics converge or where pressure impedes the free flow of lymph. He discusses the question of infection without nodules but SANDGROUND (p 768) always found a nodule when microfilariae had been discovered in the skin or conjunctiva, though sometimes only after assiduous search. Single nodules may be compounded of several

small ones each with separately walled off worms. He believes that *O. volvulus* is a parasite of cattle and eland as well as of man.

ADAMS (p 769) reports a man with eosinophilia of 33 per cent. without microfilariæ in the blood but with 9 *Aff. volvulus* in an excised piece of bulbar conjunctiva, and others in 3 of 48 skin snips. They were also seen within the eye on slit lamp examination. Symptoms were delayed probably 3 to 5 years after infection.

HISSETTE (p 768) notes that in the eye inflammatory exudate may be present where there are no larvae and larvae may exist without obvious lesions. There is a slight and slow reaction to living larvae and a clear appreciable reaction to dead ones. The pupil is typically oval or pyriform there may be punctate keratitis vascular keratitis and choroïdo-retinitis ending in optic atrophy which is the cause of the blindness which ensues. MARBAIX and APPELMANS (p 767) describe the histological appearances of a piece of conjunctiva infected with *Onchocerca*. Infiltration of the connective tissue with large reticulo-endothelial cells lymphocytes polymorphonuclears and eosinophils nodules with necrotic centres and giant cells and microfilariæ surrounded by more or less cellular infiltration were found. Diagnosis must rest on the finding of microfilariæ. ADAMS (p 769) states that treatment consists of the removal of adult worms which are not affected by any known drug though larvae may be killed with temporary improvement of symptoms by antimony and plasmoquine. LAKE (p 765) considers that certain arsenicals sterilize but do not kill the mother worms. This could be tested in a patient with onchocerca nodules by excising a nodule giving the drug treatment and then excising a second nodule and comparing the condition of the females in the two.

MOORTHY (p 769) discusses the development of *Dracunculus medinensis* in cyclops and describes abnormal forms the illustrated abstract cannot be further summarized. TREW (p 391) remarks on the importance of the step well in the causation of guineaworm infection on the presence of 56 worms in one person at the same time on the immunity to infection shown by certain people and on the value of injecting into the worm itself 1 in 1000 corrosive sublimate and using a dressing of the same solution. GORE (p 772) uses ichthyol as a compress for inflamed skin over guineaworms. MOORTHY and SWEET (p 771) in dogs infected with *D. medinensis* found adult worms in chamber of the left ventricle of the heart, in the meninges and more commonly in the subscapular and retroesophageal areas and elsewhere. Epileptic symptoms may possibly be caused in man by meningeal infection. They consider that copulation takes place in the tissues and not in the intestine and that male worms after fertilizing the females die and are absorbed. The same may be true of unfertilized or even fertilized females. Calcification is rare.

Trichuris and Enterobius Infections—DESPORTES (p 678) reports 52.4 per cent and 9.06 per cent infections with *Trichuris* and *Enterobius* in caeca and appendices preserved by BRUMPT from post mortems carried out in Paris in 1909.

DINVIK and DRINVIK (p 678) investigated the factors of temperature absence of oxygen and drying on the eggs of *Trichuris*. Dried eggs survive for a long time.

VAZQUEZ PAUSA (p 380) found that *Trichuris* infestation was cured in 95 per cent. by doses of 4 to 5 gm. Ferri et Ammon Cit. daily which also benefits the associated anaemia. MAPLESTONE and MUKERJI

(p 282) consider that tetrachlorethylene is probably unsatisfactory in Trichurus infection but gives 80 per cent. of cures in Enterobius infestation. WRIGHT *et al* (p 381) also advocate tetrachlorethylene in doses of 0.1 cc for each year of age as a single-dose treatment for Enterobius infection. They use magnesium citrate as the purgative administered at the same time.

WRIGHT and CRAM (p 678) show that Enterobius infection is often familial and that eggs are found on clothing furniture etc. Tetrachlorethylene is perhaps the most efficient anthelmintic for single-dose treatment but there is need for a cheap effective and safe anthelmintic.

CRAM *et al* (p 382) by the use of the Cellophane N.I.H. swab found a high proportion of persons harbouring Enterobius in Washington. Repeated examinations may be necessary but the swab method is better in diagnosis than the examination of faeces for eggs.

Trichinella Infections—SCHEFFLEY (p 679) estimates the incidence of Trichinella infection in man in the U.S.A. as about 20 per cent. Neither the pressed muscle nor the gastric digestion methods are capable of detecting all infections. This heavy infestation rate was not suspected during life and the incidence in swine must be high possibly 2 to 4 per cent. VAN SOMEREN (p 679) observed that gastric digestion of the wall of trichinella cysts allows the escape of a jelly like substance. The larva then becomes active and passes tail first through the opening made by digestion.

NICOLESCO *et al* (p 382) advise the examination of the sediment from blood laked with acetic acid and centrifuged for the diagnosis, by discovery of larvae of early Trichinella infection. SAWITZ (p 383) compares the results of skin testing with Trichinella antigen and of post mortem findings. Five per cent of 200 in each series gave evidence of infection and the sex and age incidences were similar. No negroes reacted to the test, but this may be due to the difficulty of reading it in a dark skin.

JONES and WELLS (p 384) describe the symptoms of Trichinella infection: puffiness of the eyelids, tenderness of muscles and eosinophilia with positive precipitin reaction and skin test. WANTLAND (p 384) shows that polycythaemia and increase in the percentage of haemoglobin occurred in 7 of 12 rabbits infected with *Trichinella spiralis* and that hyper eosinophilia was associated with marked symptoms. Increase in clotting time and erythrocytic macrocytosis were observed.

PIERCE and McNAUGHT (p 384) show that alcohol interferes with the liberation of larvae of Trichinella by gastric digestion but that sufficient concentrations in the human stomach are not maintained for the long periods necessary to kill them.

Gnathostoma Infections etc—AFRICA *et al* (p 773) consider that *G. spinigerum* requires a fresh water fish as a second intermediate host. They regard certain snakes as unsuitable hosts in which development to a certain stage only is possible. Suitable and unsuitable hosts are probably infected not by drinking water containing infected cyclops but by eating fresh water fish which in turn have eaten cyclops. MAPLESTONE and BHADURI (p 772) describe a case of infection with *Gnathostoma* and point out that the swellings even though widely separated usually cease on the removal of a single worm. Swelling of the pharynx with dyspnoea were seen in half of 25 cases analysed.

KOFOID *et al* (p 392) failed to effect transmission of *Thelazia californiensis* by means of cock-roaches and by injection or instillation of larvae into the conjunctival sac of dogs. C Wilcocks

HELMINTHIASIS

PRÉCIS OF ABSTRACTS IN THIS SECTION

COUTELEN (p 715) describes granules in the laminated cuticular layer of hydatids which stain with silver and are probably produced by cells of the germinal layer

Discussing the diagnosis of *Echinococcus alveolaris* BÜHLER and v HASSELBACH (p 715) show that only histological examination can be accurate but a tumour of the liver unassociated with any other growth deep jaundice with comparatively slight subjective disturbance X ray evidence of calcification and a long history should suggest the correct diagnosis.

CHUNG and TUNG (p 715) found that both hydatid and cysticercus cyst fluid gave strongly positive skin reactions in patients with echinococcosis cysticercosis or intestinal taeniasis. The complement fixation test with hydatid cyst fluid may be used to detect cysticercosis in man but since the undiluted fluid may give false positive reactions with syphilitic or other sera a dilution of 1:4 should be used. These tests are therefore group immunological reactions rather than specific reactions for hydatid disease alone. SERGENT *et al* (p 716) on the other hand consider that a positive result to a *first* intradermal injection of hydatid fluid is definite evidence of the presence of hydatid but that repetition of the test in a negative reactor may lead eventually to a positive result in the absence of hydatid disease through activation by the earlier injections

SAWITZ (p 716) reports the finding of a hydatid cyst in the liver of a man in Louisiana who died with a clinical picture of cirrhosis with ascites. GÓMEZ LÓPEZ and LUVA (p 716) describe a case of hydatid cyst of the base of the lung in Venezuela the first to be confirmed there. Of 7 hydatid cysts treated by MORISCO *et al* (p 717) 4 were in the lung and 3 in the liver. One of the latter simulated lithiasis with jaundice vomiting and pain

MEIJER (p 717) states that *Diphyllobothrium erinacei* (synonyms *D. mansoni* or *D. railletii*) is present in the Dutch East Indies. The plerocercoid is found in frogs rats swine and shrews

HIYEDA and TERADA (p 717) use Raigan a sort of mushroom (*Omphalia lapidescens*) for *Taenia* infection. The dose is 20 grains of the powdered plant or 0.4 grains of the active principle. It acts apparently by destroying the tissues of the worms and was successful without ill effects in over 100 cases treated.

Seventeen cases of infection with *Cysticercus cellulosae* are reported by HANASAKI (p. 718) and of these 6 showed evidence of infection by adult worms. A massive infection with cysticercus was revealed by

X-ray in a man of 68 reported by BRETON and LAVIER (p 718) There was general muscular atrophy and the cysts were most frequent in the muscles about the pelvis, back and pectoral region. Remarkable athletic powers were shown by and remained unimpaired in the patient recorded by EVANS (p 719) in whom several hundred cysts were found by X-ray in the thigh, thorax, arm and neck. AUSTONI (p 719) describes a case of cysticercosis in a girl of 10 years, who died of the infection. ALBERT (p 719) records a large cysticercus of the liver with abscess and subsequent peritonitis. The patient described by SEGAL (p 719) had a cysticercus infection of the right iliac bone with sequestrum formation, which was diagnosed radiologically as chronic osteomyelitis.

ROMAN (p 720) infected a white mouse by administering oncospheres of *H. nana*.

KOURI and DOVAL (p 720) report infection of 3 children with *Davainea* (species not stated). One suffered from asthma and anaemia, male fern and carbon tetrachloride expelled the worm.

LEÓN (p 720) describes the characters of *Raillietina guineensis* León of which the definitive host is man and the intermediate host unknown.

BEARUP and MORGAN (p 721) report 3 human infections with *H. diminuta* and 2 with *D. caninum* in Australia.

PETROV (p. 721) records the finding of *Diphyllbothrium skrjabini* (normally a parasite of dogs) in man, and of a new species *D. nensi*.

LAME (p. 721) emphasizes the four essentials for successful diagnosis of *Ascaris* and *Trichuris* infections by D.C.F. the presence of fertile eggs, the proper disintegration of faeces, the use of a vessel large enough to prevent over-concentration and a floating fluid whose *ascertained* specific gravity is just over 1.200. If these are fulfilled the collection of *Ascaris* eggs by D.C.F. is 4 to 6 times greater than by the Willis technique and the results are much more constant. Salt solution three-quarters saturated which is the optimum for hookworm eggs, is not heavy enough for *Ascaris* and *Trichuris*. He mentions air-borne infection and the breeding of cockroaches (possible carriers of *Ascaris* eggs) in borehole latrines.

YOSHIDA and TOYODA (p 722) give results of the hatching of *Ascaris* eggs in various media.

PINES (p 722) records asphyxia due to *Ascaris* in the trachea, a large ileo-caecal swelling due to masses of *Ascaris* and a hypogastric abscess containing a decomposing worm. FLAMINKI (p 723) describes a case of appendicitis due to *Ascaris*. CALADO (p 723) describes a case of intestinal obstruction due to *Ascaris*, but only 12 were expelled after an anthelmintic. LECERCLE (p 723) ascribes a case of acute haemorrhagic pancreatitis to an *Ascaris* in the bile ducts near the duct of Wirsung. CHANCO (p 723) extracted an *Ascaris* from the umbilicus of a child.

VAXXI (p. 724) produced severe haemorrhagic allergic reactions in sensitized rabbits by the injection of coelomic fluid of *Parascaris equorum*. In line with experimental results certain symptoms (urticaria, convulsions and asthma) in man are attributed to allergy to the body fluid of the worms. MACHEBOEUR and MAMDOUL (p 724) show that the toxic substance contained in the coelomic fluid and tissues of *Ascaris megalocephala* can kill a guinea-pig in a few minutes if given intravenously. It is not precipitated by trichloroacetic acid and will not pass through a collodion membrane. *Monstera expansa* has no such toxic substance.

STARKOFF (O) La preparazione dei plattelminti col metodo di Dammin. [Mounting of Platyhelminths by Dammin's Method.]—*Ann d'Igiene*. 1938. Sept.-Oct Vol. 48 No 9-10 pp 609-611 With 2 figs.

A recommendation for Italian readers of Dammin's method (thus *Bulletin* 1938, Vol. 35 p 602) for the permanent mounting of platyhelminths.
Clayton Lane

COUTELEN (F) Sur la structure et sur la morphogenèse de la membrane cuticulaire des hydatides échinococciques [The Structure and Morphogenesis of the Cuticular Membrane of Hydatids.]—*C. R. Soc Biol* 1938. Vol. 129 No 25 pp 149-151

The laminated cuticular layer of a hydatid contains granules which stain with silver and are probably put out in successive bursts by specialized or by all cells of the germinal layer. The granules break up into finer ones and those zones which lie between the lamellae of the membrane are probably those in which the granules were originally densest.
C L

BÜHLER (F) & HASSELBACH (H) Zur Diagnostik des *Echinococcus alveolaris* [Diagnosis of *Echinococcus alveolaris*]—*Muench Med Woch* 1938 Oct 23. Vol 85 No 43 pp 1665-1668

An experience of four cases of alveolar hydatid of the liver leads to these suggestions for help in a difficult diagnostic problem.

In a dweller in the Alps with this infection there will be found some of these conditions. A tumour of the liver with no evidence of another to which it could be secondary. Deep jaundice with comparatively slight subjective troubles. Good appetite. No cachexia, eosinophilia. An X-ray plate shows calcification and there is an unusually long history. In this way an explanatory laparotomy will not leave the condition labelled as cancer of the liver with undiscovered primary focus. Only histological examination can give a right diagnosis.
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CHUNG (Huei-Lan) & TUNG (Tsun) The Non-Specificity of the So-called Specific Biological Tests for Hydatid Disease.—*Trans Roy Soc Trop Med. & Hyg* 1939 Apr 6 Vol. 32. No 6 pp 697-706 [11 refs.]

"The Ghedini Wernberg's complement fixation reaction and the Cason's intradermal reaction are group immunological reactions to somatic cestode infections rather than specific reactions for hydatid disease alone. Both hydatid cyst fluid and cysticercus cyst fluid gave a strongly positive complement fixation reaction with blood of either echinococcosis patients or cysticercosis patients. Both hydatid cyst fluid and cysticercus cyst fluid gave a strongly positive cutaneous reaction on patients with either echinococcosis, or cysticercosis, or intestinal taeniasis. The cerebrospinal fluid as well as the blood of most of the patients with cerebral cysticercosis gave a strongly positive complement fixation reaction. The serum of rats infected with *Cysticercus fasciolaris* gave a weakly positive complement fixation reaction with hydatid cyst fluid. The serum of four out of nine kala-azar patients gave a positive complement fixation reaction with hydatid cyst fluid of a 1/8 dilution. This positive reaction may be related to the high globulin content of the blood of kala-azar patients. Extracts of different tapeworms are not satisfactory antigens for the

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alveolaris [Diagnosis of *Echinococcus alveolaris*].—*Muench*
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 hydatid cyst fluid of a 1:8 dilution. This positive reaction may be
 related to the high globulin content of the blood of kala azar patients.
 Extracts of different tapeworms are not satisfactory antigens for the

detection of somatic cestode infections because of their anti-complementary nature. The complement fixation test with hydatid cyst fluid as antigen may be utilized to detect cysticercosis in man (and possibly also in pigs and cows). Only the diluted hydatid cyst fluid (1:4 dilution) may be used as antigen for the complement fixation test for echinococcosis or cysticercosis, as the undiluted fluid very frequently gives a false positive reaction with the sera of patients with syphilis or other conditions. When ever both the Ghedini-Weinberg's complement fixation reaction and the Casoni's intradermal reaction are positive a differential diagnosis of somatic cestode infection and possibly also kala-azar must be considered unless the clinical picture is clear-cut.

SERGENT (Emile) FOURESTIER (Max) & GALLIANO (E. Jimenez)

Le virage de la réaction de Casoni après une deuxième ou plusieurs intra-dermoréactions. [The Activation of the Casoni Reaction after one or more Previous Intradermal Injections.]—*Bull Acad Méd* 1939 Feb 7 103rd Year 3rd Ser Vol. 121 No. 5 pp 180-182.

This paper and its discussion were summed up by Sargent in the statement that if the intradermal reaction of Casoni, in answer to hydatid fluid with no antiseptic in it, is positive on the first test a hydatid is certainly present.

On the other hand there are given instances where dissatisfied with a negative reaction to the first test it has been repeated once or twice with a final positive result and yet autopsy or operation have shown that the tumour has been a cancer the patient having been sensitized by the earlier injection.

C L.

SAWITZ (Wilh) Echinococcus Infection in Louisiana.—*Jl Parasitology* 1938 Oct. Vol 24 No 5 pp 437-439

A man of 72, who came to New Orleans when 8 years old and had not since left it, died with a clinical picture of liver cirrhosis with ascites. Autopsy showed a small nodular fibrous liver with a cyst 4 cm in diameter lined by a laminated chitmoid membrane. His work had been to feed and care for at a railway depot, animals sent by express. His family had never kept a pet dog. Two cases are noted in which *Echinococcus granulosus* was found by others in dogs in Louisiana, but the presence of cysts in sheep cattle and hogs is commonly reported.

C L.

i. GÓMEZ LÓPEZ (Luis) & LUYA (Guillermo) Un caso de quiste hidatídico del pulmón. [A Hydatid Cyst of the Lung.]—*Gac Med de Caracas*. 1938. July 15 Vol. 45 No. 13. pp 193-194 With 2 figs

ii. RÍSQUEZ (Rafael) Quiste hidatídico en Venezuela. [Hydatid Cyst in Venezuela.]—*Ibid.* pp. 195-197 [12 refs.]

1. This girl of 21 came under observation in a tuberculosis dispensary. Her general condition was good and her only trouble was headache. The sputum was free from tubercle bacilli but there was an X ray shadow at the base of the right lung. The Kahn reaction was slightly positive. It became negative after three months of intensive anti-syphilitic treatment but the character of the shadow was unchanged though in 5 months time it was bigger. An eosinophilia of 6 per cent. in the absence of facilities for complement fixation or intradermal reaction justified puncture and this produced a fluid free.

from albumin rich in chlorides and with many hydatid scolices. In discussion Risquez held that this is the first case in Venezuela confirmed by laboratory methods.

u. The author goes into the history of earlier locally reported cases but concludes that they are not convincing

C L

MOISESCO (Th) PAIDIU (V) & DUMITRESCO (D) Contributions à l'étude clinique du kyste hydatique chez l'homme Observations personnelles. [Clinical Study of Hydatid in Man.]—*Bull Acad Méd Roumanie* 1938. 3rd Year Vol. 6. No. 5 pp 671-682. With 6 figs. [17 refs]

Of the 7 hydatid cysts which the authors have had under treatment 4 have been in the lung with 1 suppurating and 3 have been in the liver with 1 suppurating and with another simulating lithiasis by virtue of jaundice vomiting and pain in the right hypochondrium.

C L

MOLLOU (W) Echinokokkenkrankheit. [Disease due to *Echinococcus*]—*Deut Med Woch* 1939 Feb 24 Vol. 65 No. 8 pp 293-296

IVANISSEVICH (Oscar) FERRARI (Roberto C) & RIVAS (Carlos L) Equinococosis hidatídica del pulmón. [Pulmonary Hydatid.]—*Bol Inst Clin Quirúrg* Buenos Aires. 1938. Sept. Vol. 14 No 119 pp 1153-1182. With 28 figs.

IVANISSEVICH (Oscar) PIÑERO (Tomás A) RISOLFA (Atilio A) & RIVAS (Carlos L) Secuelas cavitarias de los quistes hidatídicos del pulmón. [Cavities following Pulmonary Hydatids.]—*Bol Inst Clin Quirúrg* Buenos Aires 1938 Sept. Vol. 14 No 119 pp 1230-1234. With 3 figs.

LITARCZEK (Stella) & CHISAR. Kyste hydatique primitif du poumon à évolution latente (polymorphisme des manifestations cliniques à l'époque des complications. [Latent Primary Hydatid of the Lung. Its Polymorphism when Patent.]—*Bull et Mém Soc Méd Hôpit de Bucarest* 1938 Oct. Vol. 20 No. 8 pp 201-205

MEIJER (W C Ph.) Over een lintworm van hond en kat *Diphyllobothrium (Spirometra) erinacei* (Rudolphi 1819) en het bijbehorende plerocercoid. [*D (S) erinacei* Tapeworm of Dog and Cat and its Plerocercoid.]—*Nederl Indische Bladen v Diergeneesk* 1937 Dec. Vol. 49 No 5 & 6 pp 370-380 With 1 fig [12 refs.]

This tapeworm for whose name *D mansoni* and *D railletii* are synonyms is present or frequent in different parts of the Dutch East Indies where the presence of *D latum* has not certainly been established. Its plerocercoid is found in frogs rats swine and in *Crocidura* species (insectivores—the shrews)

C L

HIYEDA (Kentaro) & TERADA (Banjuro) A New Anthelmintic "Raigan" for Taeniasis. [Research Notes.]—*Jl Parasitology* 1939 Apr Vol. 25 No 2. pp 183-184

Raigan is a sort of mushroom (*Omphalia lapidescens*) which grows on sandy soil where bamboo trees are luxuriant. It is dried to the hardness of stone and sold in the market.

It was used successfully in man for *Taenia solium*, *T. saginata* and *Hymenolepis nana* and apparently for *H. diminuta* and in the dog apparently for *Dipylidium caninum*. In no case was the scolex found but the worms had not reappeared in four months. The drug is believed to destroy the tissues of the worm, for the young segments evidently of the larger worms come away in small yellowish-brown motionless pieces and the bigger ones sometimes in chains. The segments of *Hymenolepis* were rarely seen. The treatment at first was with 20 grams of powdered Raigan three times a day for 3 days, and a complete cure it is claimed, was always obtained with no ill effects in over 100 cases, there being no preparatory treatment and no after purge.

After we had succeeded in extracting the active principle from the crude material, we reduced the doses from 20 gr. to 0.4 gr. The chemical nature of the active principle has not yet been determined. We shall be glad to supply this drug to investigators in large amounts at cost or in small amounts gratis.

They write from Manchuria Medical College, Mukden Manchoukuo see also this Bulletin 1937 Vol. 34 p. 808.] C. L.

GANGOLLI (D. A.) A Case of Tape-Worm simulating Acute Appendicitis.—*Indian Med Gaz* 1933, Nov. Vol. 73 No. 11. p. 681

HANASAKI (Tameyasu) Ueber *Cysticercus cellulosae hominis*. *Cysticercus cellulosae* in Man.—*Taiwan Igakkai Zasshi* (Jl. Med. Assoc. Formosa) 1938 Oct. Vol. 37 No. 10 (403) [In Japanese pp. 1509-1522. With 2 figs. on 1 plate [34 refs.] German summary p. 1523.]

In the Okinawa prefecture 17 cases of infection with *C. cellulosae* have been seen in six years. Evidence of intestinal infection by the adult displayed by eggs or segments was found in 6 of the 17.

C. L.

BRETON (M.) & LAVIER (G.) Un cas de cysticercose musculaire généralisée décelée par la radiographie. (A Case of Generalized Cysticercosis of Muscles revealed by X Rays.—*Bull. et Mém. Soc. Méd. Hôp. de Paris*, 1938, Dec. 19 64th Year 3rd Ser. No. 34 pp. 1721-1725 With 1 fig.)

X-rays undertaken on suspicion of a latent prostatic neoplasm with vertebral metastases disclosed a most massive infection of muscle by cysticerci.

The man of 66 was very weak with general muscular atrophy, a fairly thick adipose tissue covering and no nodules palpable anywhere. Red cells 3,643,000 leucocytes 4,600 eosinophils 1 per cent. The X-ray shadows were most frequent in the muscles about the pelvis, the back and the pectoral region. The right leg was chosen for illustration because the shadows were discrete and their shape evident. The face probably showed two shadows. Excision of a nodule from the calf disclosed what was believed to be a calcified cysticercus. The infection has far from disappeared from France. C. L.

EVANS (R. R.) *Cysticercosis in an Athlete.*—*Trans Roy Soc Trop Med & Hyg* 1939 Jan. 28. Vol. 32. No 4 pp 549-550 With 2 plates

As an athlete this bandsman of 24 had played regularly for the band team in Association football and hockey had recently been tried out for the Battalion Rugby team and had represented the battalion in 120 yards hurdles relay race and cross country running. He had had nodules removed and identified as cysticerci but following this and a lumbar puncture he had an epileptic fit. In August 1937 he was admitted to hospital following a fit but pleading to be allowed to leave it he got second place for the long jump in the Highland Games at Crieff with a jump of 21ft. 5 in. He had never had a tapeworm or such symptoms of invasion as muscular pains rheumatism headache or fever. X ray plates show in the upper two-thirds or so of one thigh and in the thorax arm and neck, several hundred cysts and yet his athletic prowess seemed to be unimpaired. C L

AUSTONI (Miano) Su di un caso di cisticercosi generalizzata grave [Severe Generalized Cysticercosis].—*Policlinico Sez Prat.* 1939 Apr 3 Vol. 46 No 14 pp 627-30 633-6 639-43 With 11 figs. [30 refs]

A girl of 10 died of cysticercosis it being estimated that there were 15,000 to 20,000 cysts mostly in the muscles few in the abdominal organs and subpleurally in the lungs. During life submaxillary and dorsal swelling, exophthalmos headache vomiting fits and weakness were marked. The infection is attributed to *Taenia solium*. The considerable list of literature while going back to 1860 has no mention of English literature and of the great advances reported by MACARTHUR and others. C L

ALBERT (Zygmunt) Ein grosser Zystizerkus der *Taenia solium* in der Leber [A Large Cysticercus of *Taenia solium* in the Liver].—*Zent f Bakt I Abt. Orig.* 1938. Oct. 17 Vol 142. No 7/8 pp 374-376 [10 refs]

In the liver of a 36-year-old woman was a large cysticercus with abscess and subsequent peritonitis. It was identified as such by appearance and by the presence of an adult in the bowel. No trace of echinococcus was found in spite of careful search. C L

SEGAL (A) A Case of Cysticercosis of Bone.—*South African Med J* 1938. Oct. 22. Vol. 12. No. 20 pp 762-763

A condition believed to be chronic osteomyelitis of the right iliac bone displayed itself after three years to be a cysticercus infection.

A swelling in the right buttock was after 10 months excised as a cyst but on operation the diagnosis was changed to a ganglion containing sterile pus and originating from a diseased right iliac bone a diagnosis confirmed by X rays which displayed sequestra. These were removed, and sinuses eventually closed only to reopen shortly. It was then found repeatedly that when a needle was inserted into the swelling which was present it would withdraw a little fluid only, but if now put in in another direction more would come through it.

Finally it was drained of a large quantity of fluid, an intact grape-like cyst and several collapsed ones. PIJPER reported a typical cysticercus wall which, however, had no scolices. C. L.

SHIMOKAWA (Hachio) & IKOUYE (Hisashi) Ein Fall von *Cysticercus cellulosae* hominis. [A Case of *Cysticercus cellulosae* in Man.]—*Taiwan Igakai Zasshi* (Jl. Med. Assoc. Formosa) 1938 Oct. Vol. 37 No. 10 (103) [In Japanese pp. 1524-1528 With 2 figs. [27 refs.] German summary p. 1529.]

GALLAIS (P) Deux cas de cysticercose cérébrale avec manifestations épileptiques. [Two Cases of Cerebral Cysticercosis with Epileptic Symptoms.]—*Bull. Soc. Path. Exot.* 1938, Dec. 14 Vol. 31 No. 10 pp. 915-919

ROMAN (E.) Sur l'infection des rongeurs par l'*Hymenolepis nana* de l'homme. [Infection of Rodents with *H. nana* from Man.]—*Ann. Parasit. Humaine et Comparée* 1939 Jan. 1 Vol. 17 No. 1 pp. 12-16. With 1 fig. [14 refs.]

Of five white mice fed on onchospheres of *H. nana* passed by a French girl with diarrhoea 1 was found infected when killed 4 days later. All the larvae were in the last quarter of the small intestine. C. L.

KOURI (Pedro) & DOVAL (José Macho) Tres casos de parasitismo humano por especies de la familia Davameidae. [Davamea Species in Three Persons.]—*Rev. Med. Trop. y Parasit. Habana* 1938, July-Aug. Vol. 4 No. 4 pp. 207-217 With 7 plates. English summary.

A preliminary paper in which determination of the species is not made.

The parasites were found in three children from 18 months to 9 years old, the last being reported in detail. He had had a tapeworm for 6 years and had suffered from an asthmatic condition, bronchitis, headache and weakness with anaemia (red cells 3.7 millions) and haemic mitral murmur. There were no eggs in the faeces but segments were passed. Treatment consisted of one of 12 capsules given every five minutes which in all contained 4 cc. of ethereal extract of male fern and 1 cc. of carbon tetrachloride the worm being expelled after the seventh capsule. C. L.

LEÓN (Luis A.) Contribución al estudio de la parasitología Sud-americana. El género *Raillietina* y su frecuencia en el Ecuador [On South American Parasites. *Raillietina* in Ecuador]—*Rev. Med. Trop. y Parasit. Habana* 1938, July-Aug. Vol. 4 No. 4 pp. 219-230 With 9 figs. on 5 plates.

León reports the detection in Ecuador of nine infections of man by *Raillietina gusmanii* León, 1935.

The list of references does not include that in which he named the tapeworm. It is described as 10 to 12 metres long and 3 mm. broad with retractile rostrum and 2 rows of hooks, suckers ovoid and averaging about 1 mm. across with a surrounding row of persisting hooks. There are about 5 000 segments at first wider than long, then square and about 3 mm. across the terminal segments have 200 to 250 egg

capsules genital pores unilateral onchospheres oval with very long hooks definitive host man intermediate host unknown found in Ecuador It has caused abdominal pain nausea, diarrhoea, weakness headache vertigo and mental dullness. C L

BEARUP (A. J.) & MORGAN (E. L.) The Occurrence of *Hymenolepis diminuta* (Rudolphi, 1819) and *Dipylidium caninum* (Linnaeus, 1758) as Parasites of Man in Australia.—*Med Jl Australia* 1939 Jan. 21 26th Year Vol. 1 No 3 pp 104-106 [27 refs.]

Having noted that, in the Australian hookworm campaign under SWEET from 1919 to 1924 which examined 202 582 persons *Hymenolepis nana* was found in 0.2 per cent and *Taenia solium* or *T. saginata* in 0.02 per cent. there are reported three human infections with *H. diminuta* and two with *Dipylidium caninum* all in children. The two latter are believed to be the first recorded from the continent.

C L.

LIDDO (Salvatore) *Hymenolepis diminuta* nella provincia di Bari [*H. diminuta* in Bari Province Italy]—*Pathologica* 1938 Oct 15 Vol. 30 No 664 pp 436-437 [11 refs.] English summary (5 lines)

There were found in the faeces of a person 20 years old, the onchospheres of *Hymenolepis diminuta* eggs of *T. trichiura* a lamblia a bodo *E. coli* and *Blastocystis hominis* References are given to the 12 Italian cases. C L

PETROV (M. I.) New Diphylobothrids of Man.—*Med Parasit & Parasitic Dis* Moscow 1938 Vol. 7 No 3 [In Russian pp 406-413 With 10 figs. English summary p 414]

The author describes two species of diphylobothrids found by the 113th All Union Helminthological Expedition of the Institute of Tropical Medicine during medical treatment of the inhabitants of the Ventral national district of the Northern region. One of the species *Diphylobothrium skrjabini* had been described by Plotnikov as living in dogs and was for the first time found by the author in man. The second species, *Diphylobothrium nensei* is a new species.

LANE (Clayton) Points in the Diagnosis and Prevention of *Ascaris* Infection.—*New Zealand Med Jl* 1939 Feb Vol. 38 No 203 pp 23-26

A restatement of points, deemed important but too little known is made concerning the diagnosis and prevention of *Ascaris* infection.

As to diagnosis this section is essentially a comment on a statement by DEMPSEY [this *Bulletin* 1939 Vol. 36 p 320]. All authorities are agreed that the Willis technique is more accurate [than D.C.F.] in demonstrating ova of *Ascaris* and *Trichuris*. Uncertain as to what constitutes an authority Lane writing as a worker points out that to be soundly based comparative tests of diagnostic technique must rely on counts of the eggs which each recovers from the same evened material and that there are four essentials for successful diagnosis of *Ascaris* and *Trichuris* infections by D.C.F. namely—the presence of fertile eggs the proper disintegration of faeces the

use of a vessel large enough to prevent over-concentration, and a floating fluid whose *ascertained* specific gravity is just over 1,200. Special stress is laid on the last essential. When these essentials were fulfilled the collection of *Ascaris* eggs averaged 4 to 6 times greater by D.C.F. than by the Willis technique—moreover the lowest and highest counting by D.C.F. varied as 1 to 1.5 those by the Willis technique as 1 to 18 or 1 to 28 according as to which form of it was used. If there was used for floatation a three-quarters-saturated salt solution, the strength optimum for showing up hookworm eggs, the loss of *Ascaris* and *Trichuris* eggs was great. Stating the actual deliveries as percentages of a total content otherwise ascertained the figures for *Ascaris* got by D.C.F. and by the two variations of the Willis technique, when all used a saturated common salt solution, were 42, 7 and 13 and when all used a three-quarters-saturated solution they were 4, 1 and 3—the corresponding figures for *Trichuris* eggs were 25, 6 and 10 for the saturated and 1.6, 5 and 6 for the three-quarters-saturated solution.

As to prevention, some of the evidence for air-borne infection is repeated [see this *Bulletin* 1934 Vol. 31 p. 605] and the further evidence of HEADLEE [this *Bulletin* 1937 Vol. 34 p. 449] is noted. There is added the report by BULL [this *Bulletin* 1937 Vol. 34 p. 431] on the excellence of widely used borehole latrines as breeders of cockroaches and so as possible disseminators of *Ascaris* eggs, not as an advocacy for the discarding of latrines but as a reminder that the teaching of behaviour theoretically good may produce a condition practically bad—an urgent need of something better as a latrine—no easy matter to devise but admitting of no complacency or relaxation of effort.

C. L.

YOSHIDA (Sadao) & TOYODA (Harumaga). Artificial Hatching of Ascarid Eggs.—*Livro Jubilar do Prof. L. Travassos*. Rio de Janeiro 1933. pp 569-577. With 6 figs.

The essence of the results of this paper are found in its Table 7 which gives the percentage of "dog ascaris" "human ascaris" and "pig ascaris" eggs which have hatched out in five days in 17 different media. Taking "human ascaris" the average of the percentages of successful hatchings in media which are not digestive juices is 41.0. For the digestive juices they were—artificial gastric juice 22, bile 28, pancreatic juice 31, artificial intestinal juice 1. In these media the most favourable temperature was between 36° and 40°C. At temperatures down to 24° few embryos hatched, but those that did were more active and more resistant to chemicals. [The writers give no references. A number will be found quoted as for this *Bulletin* in the review 1934 Vol. 31 p. 605 in which also there is reference to BROWN's report that the only condition which inevitably produced hatching of mature eggs was drying followed by moistening.]

C. L.

PIRES (Jesus Ribeiro). Asphyxia, obstrução intestinal e abscesso por ascaris (Asphyxia, Intestinal Obstruction and Abscess from Ascaris).—*Brasil Medico* 1938. Oct. 29 Vol. 52. No. 44 pp 887-888.

After urging that patriotism demands a clearing up of parasites in the "70 to 80 per cent. of Brazilians who have worms, Pires describes 3 of "innumerable" clinical cases of *Ascaris* infection. The first was a

child who died of asphyxia from 2 ascarids in the trachea [see this *Bulletin* 1929 Vol. 26 p 987] The second was one of 12 years old gravely ill with a great ileo-caecal swelling diagnosed as a haematoma on which after consultation it was decided to operate next day but in the meantime one of the family gave a tea of the herb Santa Maria with expulsion of 280 ascarids and disappearance of the haematoma [see this *Bulletin* 1924 Vol. 21 p. 957 1925 Vol. 22, pp 489 490 1927 Vol. 24 p 189] The third was a large extraperitoneal hypogastric abscess with foetid pus and a decomposing *Ascaris*.

C L

FLAXENT (Silvio) Contributo allo studio delle perforazioni intestinali da ascaridi. [On Intestinal Perforation by Ascaris.]—*Riforma Med* 1938 Nov 5 Vol. 54. No 44 pp. 1701-1703. With 1 fig

A child of 5 was admitted with evidence of acute appendicitis. On its operative removal, the head half of an *Ascaris* was found filling the lumen of an inflamed appendix, the tail half being passed in the first stool. Near the organ's apex there was a solution of continuity affecting mucosa and muscular coat with a haematoma under the peritoneum. On histological examination only the serosa was entire. Convalescence was uninterrupted. Literature on the subject is discussed but the editor found no room for the list of references. [See this *Bulletin* 1936 Vol. 33 p 109 1937 Vol. 34 p 23] C L

CAJADO (Itiberé de Castro) Occlusão intestinal por ascaris [Intestinal Obstruction by Ascaris.]—*Brasil Medico* 1938 July 16 Vol. 52. No 29 pp 657-662. [16 refs] English summary

After a tussle with a schoolmate the inguinal hernia in the right scrotum of a boy of 13 disappeared and he had severe right iliac pains. Internal strangulation of the hernia was suspected. Laparotomy revealed in the left iliac fossa loops of the ileum adherent to one another and filled it is said with a great number of ascarids and abundant faecal matter. The appendix was long and inflamed. It was excised the adhesions were cut through the mass in the ileum propelled into the caecum and pituitary extract given. Apparently the ascarids passed only numbered 12 in answer to a vermifuge given after his discharge from hospital. C L.

LECERCLE. Pancréatite aiguë hémorragique et ascaride. [Acute Haemorrhagic Pancreatitis and Ascaris.]—*Bull Acad Med* 1939 Mar 7 103rd Year 3rd Ser Vol. 121 No 9 pp 342-344

Acute rapidly fatal haemorrhagic pancreatitis of which a probable aetiological factor was the presence in the bile ducts near the duct of Wirsung of an *Ascaris* 22 cm. long C L.

CHANCO (Pedro P) Jr An Unusual Exit of an Adult Ascaris from a Child.—*Jl Philippine Islands Med Assoc* 1938 Nov Vol. 18 No 11 pp 709-714 [21 refs]

A child of 3 whose umbilicus had discharged at intervals since the cord separated after birth was seen to have a reddish projection from it which hurriedly withdrew when a stick of silver nitrate was put on it.

Next day it showed again, when wiped with cotton it came out a little further and was seized with forceps and pulled out with ease but evidently with pain to the child followed by great relief. There were still eggs in the faeces but the anus healed. [See this *Bulletin* 1935 Vol. 32 p. 257] C. L.

GHOSH (A. K.) A Case of *Ascaris lumbricoides* Infection simulating Cerebral Type of Malaria.—*Indian Med Gaz.* 1938. Oct. Vol. 73. No. 10 p. 614

VANNI (V.) Ascariodose et phénomène de Sanarelli. [Ascariasis and the Sanarelli Phenomenon.—*C. R. Soc. Biol.* 1938 Vol. 129 No. 34 pp. 1052-1055]

From the use of the coelomic fluid of *Parascaris equorum* for injection into rabbits it is concluded that ascarids contain a substance which produced in 3 of 20 sensitized rabbits the cutaneo-visceral haemorrhagic allergy described by Sanarelli.

There was massive shedding of epithelium particularly in kidney and intestine and haemorrhages into skin and viscera and, in line with experimental results, certain symptoms which occur in this infection in man and particularly in children (urticaria convulsions and asthma) are attributed to allergy in susceptible individuals caused by the body fluid of the worms C. L.

1. MACHEBOEUR (M.) & MANDOUZ (R.) A propos de la toxicité des extraits d'*Ascaris* [Toxicity of *Ascaris* Extracts.—*C. R. Soc. Biol.* 1939 Vol. 130 No. 10 pp. 1032-1034]

2. MANDOUZ (R.) Etude comparative de la toxicité des extraits d'*Ascaris* et de *Taenia* [Toxicities of *Ascaris* and *Taenia* compared.—*Ibid.* pp. 1035-1036]

1. The toxic substance which *Ascaris megalocephala* contains given intravenously in appropriate dose kills a guinea-pig in a few minutes. It is not precipitated by trichloroacetic acid and does not pass through collodion. It is not then a toxic amine like histamine nor an albumin or globulin, nor a toxin like those of bacteria, nor is it like a phytotoxin.

2. *Monilia expansa* has no such toxic substance as has *A. megalocephala*. That of the latter resides not only in the coelomic fluid but in the tissues and is far better extracted by trichloroacetic acid than by normal saline C. L.

RABIES

A REVIEW OF RECENT ARTICLES. LXXI

1. VIRUS.

KLIGLER and BERNKOPF¹ state that they have now succeeded in cultivating the virus of rabies in the developing chick embryo. In one

For the thirtieth of this series see this *Bulletin* 1939 Vol. 36 p. 193

KLIGLER (J. J.) & BERNKOPF (H.) Cultivation of Rabies Virus in the Developing Chick Embryo. [Correspondence]—*Nature* 1939 May 27 Vol. 143 No. 3630 pp. 899-900.

series the virus has been carried through nine and in a second through six successive passages without loss of virulence. The virus is present both in the allantois and in the brain but always in higher concentration in the latter. This success (*cf* this *Bulletin* 1939 Vol. 36 p 193) depends apparently on the age of the embryo at the time of infection as well as at the time of passage. With embryos of eight days or more the results are usually negative but embryos of 5-6 days are readily infected and serial passages can be maintained without any difficulty if they are made 9-10 days after infection. The embryo brain removed 9-10 days after the infection was infective for mice in dilutions of 1/1000 to 1/10000. Passages from embryo to embryo can be made with emulsions of either allantois or embryo brain.

The successful cultivation of the virus of Ajjeszky's disease on the chorio-allantoic membrane of the chick is reported by GLOVER.² The strain has now been carried through 55 generations. The strain has become modified in its effect upon laboratory animals. The period of incubation has been lengthened local pruritus is no longer produced and the characteristic pulmonary lesions are much diminished in intensity nevertheless the virus is still as lethal as infective rabbit brain. The observation of MESROBEAU (this *Bulletin* 1938 Vol. 35 p 643) is thus confirmed.

A test which it is stated distinguishes fixed from street virus is suggested by LEGEZYNSKI.³ White mice are inoculated intracerebrally with a small quantity of a 1 in 10 dilution. If the strain is fixed virus then the incubation remains constant in successive subpassages. On the contrary with street virus subpassages through white mice (after an initial passage in the rabbit) give varying incubations and after 4 to 6 the strain becomes avirulent and the mouse survives. A result of this nature cannot be obtained with white rats.

A process is described by NICOLAU⁴ for staining the elementary corpuscles obtained by fractional and repeated ultra-centrifugalization (3000 to 6000 revolutions per minute) and subsequent digestion by trypsin or papaine from suspensions of brain material of animals which died of rabies or of Ajjeszky's disease. A film is made of the deposit and dried at 37°C. This is fixed in the flame or in methyl alcohol. A staining solution containing —

Isamine blue (Grübler)	1 gm.
Carbolic acid	3 gm.
Ethyl alcohol	10 cc
Distilled water	100 cc

is poured upon the film which is warmed over a flame for 10 minutes. After washing in tap water and drying the film is examined. In both rabies and Ajjeszky's disease small coccal forms are seen with 1000 magnification. The dimensions of these forms vary from 90 to 250 μ .

² GLOVER (R. E.) Cultivation of the Virus of Ajjeszky's Disease on the Chorio-Allantoic Membrane of the Developing Egg.—*Brit. J. Experim Path* 1939 Apr Vol. 20 No. 2. pp 150-158.

³ LEGEZYNSKI (Stanislaw) Différences dans le comportement du virus fixe de la rage et des virus de rue inoculés par passages dans l'encéphale des souris blanches.—*C R Soc Biol* 1939 Vol. 130 No 12. pp 1321-1322.

⁴ NICOLAU (S) Méthode très simple pour la coloration de certains corpuscules élémentaires (inframicrobes, agents, étiologiques de maladies à ultravirus) par trypsine, vaccine rage herpès maladie d'Ajjeszky peste aviaire.—*C R Soc Biol* 1939 Vol. 130 No. 10 pp. 893-898. [13 refs.]

A strain of virus designated J which had, during 187 passages covering 6 years, become fixed with an incubation period of 3 days, and with which Negri bodies had never been found in the horn of Ammon was kept by JOHANNESCO² in 30 per cent. glycerine at 6°C. for a period of 144 days. The first rabbit inoculated thereafter had an incubation period of 16 days, and numerous Negri bodies were found. After 15 subsequent passages the incubation had shortened to 3 days. Negri bodies were not found after 5 passages. Thus prolonged exposure to glycerine produces an alteration, which takes a number of passages to wear off.

h. Symptoms and Diagnosis.

After a comprehensive summary of the earlier literature relating to the paralytic form of human rabies, PAWAN³ cites a case which he observed in 1919 in Trinidad. The bite was inflicted by a cat, and the symptoms which supervened were inability to swallow and paralysis of the leg and body culminating in death. He then goes on to describe the symptoms which were observed in the epidemic of paralytic rabies in Trinidad in 1931.

A general article on the diagnosis of rabies in man and in animals is contributed by CORWELL.⁴

iii. Pathology

That infection with rabies can be achieved by the introduction of an emulsion of an aggressive strain of street virus into the bladder is shown by REMLINGER and BAILLY.⁵ Three dogs were so treated, and in each case rabies supervened, as shown by subsequent animal inoculation. The authors point out that this does not prove that infection took place through the mucosa of the bladder. The emulsion may on the one hand have ascended into the ureter and on the other the urethra may have been damaged, although every precaution was taken to avoid this latter possibility. The authors have obtained a positive result only with aggressive street virus strains.

In a second communication REMLINGER and BAILLY⁶ show that the virus of Aujeszky's disease is similarly transmissible. Out of three experiments with this virus two gave positive results.

Changes in the cholesterol and lipid content of blood serum and organs after infection with Aujeszky's virus are described by JOHANNESCO and ZICRAVESCO.⁷ Cholesterol which in normal rabbit serum

JOHANNESCO (Demetru) Modification durable d virus rabique renforcé "J" due à la glycerine.—*C. R. Soc. Biol.* 1939 Vol. 130 No. 6 pp. 578-580. With 1 chart. U. refs.]

PAWAN (J. L.) Paralysis as a Clinical Manifestation in Human Rabies.—*A. Trop. Med. & Parasit.* 1939 Mar. 31 Vol. 33 No. 1 pp. 21-29 [22 refs.]

CORWELL (John H.) The Diagnosis of Rabies.—*New Orleans Med. & Surg. J.* 1938 Dec Vol. 91 No. 6 pp. 302-304

REMLINGER (P.) & BAILLY (J.) Transmission de la rage au chien par os écale.—*C. R. Soc. Biol.* 1938 Vol. 129 No. 31 pp. 739-741

REMLINGER (P.) & BAILLY (J.) Transmission de la maladie d'Aujeszky au chien par os écale.—*C. R. Soc. Biol.* 1938 Vol. 129 No. 24 pp. 1057-1058

² JOHANNESCO (D.) & ZICRAVESCO (I.) La cholestérine dans le serum sanguin et les lipides totaux dans les organes, au cours d la maladie d'Aujeszky.—*C. R. Soc. Biol.* 1939 Vol. 130 No. 6 pp. 551-553.

measures 49.26 mgm per 100 cc. rises in Aujeszky's disease to 73.94. The lipoids of the brain normally 47.81 gm per 100 gm dry material decrease to 44.68. The lipoids of the heart increase from 20.97 gm per 100 in the normal rabbit to 24.35 in animals which have died of the disease. The lipoids in the spleen rise to 21.75 gm. per 100 as compared with 15.39 in the normal. Thus in Aujeszky's disease there is an increase in the cholesterol of the blood, an increase of total lipoids in the heart and spleen, and a decrease in the lipoids of the brain.

JOHNESCO¹¹ reports that he has obtained a powerful antirabic serum in an ass treated with phenol vaccine (5 per cent brain material 1 per cent phenol heated 3 days at 37°C). The neutralizing power of this serum has remained constant (1 to 5) during a year. Of 5 guineapigs which had been intracerebrally inoculated with rabies virus after having received three 10 cc. doses of antirabic serum three showed prolongation of the incubation period. The fresh serum of the immunized ass contained neurotoxins which gave rise to symptoms of irritation. Heating of the serum for 10 minutes at 56°C. or keeping it at 6°C. for 2 weeks destroyed the neurotoxins without affecting its viricidal power.

11. *Methods of Treatment and Statistics*

In a scholarly article REMLINGER¹² discusses the considerations which govern antirabic treatment. He discusses methods of treatment and in particular the relative efficacies of living and dead vaccines in the treatment of bitten persons. After summarizing the experimental and statistical evidence he concludes that phenolized vaccines have an efficacy at least equal to other vaccines and in particular to dried cords that they are inoffensive in that four times as many accidents occur with living vaccines as with dead that they can be produced with a maximum of economy and convenience. He draws attention to the fact that throughout the world more persons are treated by phenol vaccines than by all other methods combined, and that in no instance has an institute which adopted treatment by phenol vaccine abandoned this method of treatment and reverted to its original method.

In a further communication REMLINGER and BAILLY¹³ describe experiments comparing treatment by dried cords with treatment by phenol vaccines (Semple). Of 10 rabbits treated with dried cords 7 contracted rabies of 20 treated by Semple's vaccine 12 died whilst of an untreated control group of 12 9 contracted the disease. In a similar experiment with dogs 2 out of 8 died after treatment with cords 3 out of 10 after treatment with Semple's vaccine and 7 out of 8 of the untreated. They conclude from these experiments that Semple's vaccine affords a degree of protection at least equal to that given by dried cords.

¹¹ JOHNESCO (Dimitre). *Recherches sur un sérum anti-rabique.*—*C. R. Soc. Biol.* 1939 Vol. 130 No. 11 pp. 1145-1148.

¹² REMLINGER (P). *Quelques considérations sur le traitement antirabique.*—*Rev. d'Hyg. et de Méd. Préventive* 1939 Apr Vol. 61 No. 4 pp. 241-251 [12 refs.]

¹³ REMLINGER (P) & BAILLY (J). *Comparaison des vaccins antirabiques phénolés et des moelles desséchées.*—*Bull. Acad. Méd.* 1939 Jan. 10 103rd Year 3rd Ser. Vol. 121 No. 1 pp. 27-30.

A series of experiments has been carried out by LÉVINZ and SAUTTER¹⁴ to determine whether there is any difference in the time of appearance of immunity after treatment by dried cords and treatment by Fermi's phenol vaccine. To answer this question parallel groups of rabbits received daily treatment for 5, 10 and 15 days by each of the two methods. These treatments were so arranged that the last injection for each series was given on the same date. Ten days later a test dose was given to each animal. It appeared that with a treatment of 5 days by dried cords the incubation period was prolonged but no animal was saved, whilst treatment by Fermi's vaccine was totally efficacious. With a 10 days treatment by dried cords 5 out of 8 contracted rabies whilst when the treatment was that of Fermi there were no deaths from rabies amongst 4 animals. With 15 days treatment in the case of dried cord treatment 3 of 3 died of rabies, whilst in the case of Fermi's treatment none out of 4 contracted the disease. The authors conclude that 10 days is a minimum for treatment by Fermi's method, and that even 15 days is efficacious when treatment is by dried cords although a certain "precocity" in the date of onset has been observed. [Confirmation of these results would appear to be called for.]

Experimental observations on the results of treatment of mice with formalized tissue culture virus are reported by KLIGLER and BERNKOPF.¹⁵ The cultures were prepared according to the method of Webster and Clow. After 4 to 5 days incubation the cultures were centrifugalized in large tubes the supernatant fluid removed, and the sediment triturated with a glass pestle. The ground material was resuspended in the supernatant fluid and 0.1 per cent formalin added. As a rule the titre of the culture was tested by mouse inoculation before adding the formalin: the cultures used contained from 5,000 to 50,000 lethal mouse units per cc. All vaccines were tested for sterility and also for inactivity by intracerebral inoculation into at least 2 mice."

A first series of experiments was designed to ascertain the immunizing effect of varying doses and number of injections. Out of a total of 29 mice given 5 to 7 injections of inactivated virus intraperitoneally 13 (45 per cent.) were fully immune to at least 10 lethal intracerebral mouse units of test virus, and 4 (13.5 per cent.) were partially immune as indicated by prolonged incubation period (14 to 24 days) 2 or 3 times that of the controls. One group of 8 mice which received only 1 injection of vaccine succumbed to the test virus in the same period as the controls. The controls numbered 13 none of which survived the test dose.

In a second series the test dose was given intraperitoneally. In this case immunity was more easily established, and it was found that "even a single intraperitoneal treatment with the inactivated culture virus is sufficient to protect mice against an intraperitoneal infection with a dose of fresh virus which kills about two-thirds of the control mice. A similar immunity is conferred against a subcutaneous infection except that a larger amount of vaccine is required."

¹⁴ LÉVINZ (P.) & SAUTTER (A.) Moment d'apparition de l'immunité antirabique chez les lapins traités.—C. R. Soc. Biol. 1939 Vol. 130 No. 7 pp. 617-618.

¹⁵ KLIGLER (I. J.) & BERNKOPF (H.) Studies on Antirabic Immunization with Formalized Culture Virus.—Brit. J. Experim. Path. 1938, Dec. Vol. 19 No. 6 pp. 374-383.

From 1919 to 1928 the vaccine employed in Prague was prepared after the formula of Cumming. Owing to the occurrence of paralytic sequelae the method was at the latter date changed to that of Fermi and since then no troublesome sequelae have been encountered. From various experiments BOUČEK¹⁶ found that phenol in a concentration of 1 per cent had a toxic action on mice. He has accordingly introduced a modification. A 10 per cent suspension of brain substance in 1 per cent phenol saline is prepared and kept at 20°C. Before use the suspension is diluted with an equal quantity of normal saline. Such a suspension induces no toxic symptoms in mice, and the immunizing properties of the vaccine are not impaired.

An epizootic of rabies commencing in November 1934 is described by LEWILLOX¹⁷. Following the canine epizootic twelve persons were given antirabic treatment. One of these in spite of treatment by Fermi's method died of rabies.

Of 2 331 persons treated at the Haffkine Institute at Bombay¹⁸ during the year 1936 2 (0·08 per cent) contracted the disease in spite of treatment by Semple's vaccine. Full statistical tables relating to the persons treated are given by SOKHEY.

Of 2,399 persons treated in Palestine¹⁹ during the year 1937 2 (0·10 per cent) contracted the disease. The vaccine used is that of Semple. One neuro-paralytic accident occurred. The case proceeded to recovery. It is of interest to observe that this is the first case of paralytic accident in Palestine since 1932 since which year 8 741 persons have received antirabic inoculations.

Rules regarding the indications for antirabic treatment as applied in the German Institutes are published by BOECKER and JAHN²⁰.

v Rabies in Animals

An epizootic of rabies commenced in the Settlement of Singapore²¹ in June 1937. During the months of September October and November eleven dogs died of the disease making a total including the original case of twelve cases five of which occurred in dogs which had been vaccinated prophylactically. Mass vaccination was carried out from September onwards and a total of 11,942 dogs were treated.

SMITH, MCGUIRE, STEPHENS and LAHIRI²² draw attention to the fact that no death from hydrophobia has been reported at the Pasteur Institute at Kasauli and its out-centres during the past 30

¹⁶ BOUČEK (J.) Notre modification du vaccin antirabique.—*Traité de l'Hyg. Pub. Etat Tchécoslov.* 1933. Vol. 9 No 3-4 pp 125-128.

¹⁷ LEWILLOX (R.) Contribution à l'étude nosologique de la région de Stanleyville.—*Ann. Soc. Belge de Méd. Trop.* 1938. June 30 Vol. 18 No. 2. pp. 353-368. With 1 chart. [Rabies pp 364-367.]

¹⁸ BOMBAY REPORT OF THE HAFKINE INSTITUTE FOR THE YEAR 1937 [SOKHEY (S. S.) Director] [Rabies pp. 28-28 53-53.]

¹⁹ PALESTINE DEPARTMENT OF HEALTH ANNUAL REPORT FOR THE YEAR 1937.—[Rabies pp. 92-95 106-106.]

²⁰ BOECKER (Eduard) & JAHN (Gertrud) Die Indikation der Wutschutzbehandlung.—*Reichs-Gesundheitsblatt.* 1939 Jan. 25 Vol. 14 No. 4 pp 58-59.

²¹ MALAYA REPORT ON THE VETERINARY DEPARTMENTS FOR THE YEAR 1937 [WHITWORTH (S. H.) Director of Vet. Research & Vet. Adviser]—Rabies pp 60-77 With 2 plates.

²² SMITH (R. O. A.) MCGUIRE (J. P.) STEPHENS (E. D.) & LAHIRI (B. N.) The Treatment of Animals with Antirabic Vaccine.—*Indian Med. Gaz.* 1938. Dec. Vol. 73 No 12. pp 736-739.

years for infections caused by horses, cows, donkeys or buffaloes, although the saliva of these species of animals has been proved by different workers to contain the virus. They then discuss the treatment of animals which have been exposed to infection. Using the same vaccine as is used for human treatment but in larger doses (which vary according to the weight of the animal) over a period of 7 days they have obtained the following results.

	1936		1937	
	Number	Died of rabies	Number	Died of rabies
Dog	645	2	711	3
Horse mule	10	0	25	3
Cow bullock, buffalo	4	0	27	0
Elephant	—	—	1	0
Cat	1	0	—	—
Monkey	—	—	1	0
Totals	660	2	765	6

vi. Post Vaccinal Paralysis.

A case of accident after treatment by Calmette's method is described by HORACK.³³ The patient developed encephalitis but showed no symptoms of paralysis. The patient's family history and the manner in which he reacted to the vaccine suggested that the local reactions and early manifestations of generalized lymph node enlargement might be viewed as an allergic response to the protein contained in the nervous tissue of the vaccine and that the clinical picture of encephalitis which followed (papilloedema headache vomiting, increased c.s.f. pressure) might likewise be an allergic response to the protein of the inocula. Impressed by this Horack made a survey of 16 persons known to have had severe accidents as the result of treatment and compared them with a control group of 45 persons in which no neuroparalytic accidents had occurred. In 87.5 per cent. of the former group personal or family history of allergic disease was elicited, as compared with 33.3 per cent. of the latter. A method of desensitization was successfully employed in 3 cases which had, or developed, a marked sensitivity to the antirabic vaccine.

vii. Miscellaneous.

In a lengthy article BALOZZI³⁴ discusses rabies as it occurs in tropical and subtropical countries, its geographical distribution the animal vectors and the nature of the strains of virus. *Oulon feto* and the epizootics of paralytic rabies which occur in South America are dealt with, and measures of prophylaxis and treatment are discussed.

³³ HORACK (Harold M.) Allergy as a Factor in the Development of Reactions to Anti-Rabic Treatment—*Amer. J. Med. Sci.* 1939 May Vol 197 No 5 pp 672-682 (22 refs.)

³⁴ BALOZZI (L.) Etat actuel de nos connaissances sur la rage dans les contrées tropicales et sub-tropicales et sa prophylaxie. La vaccination préventive des chiens—*Arch. Inst. Pasteur de Tunis* 1939 Dec Vol 27 No 4 pp 450-469

A summary of present-day knowledge regarding the bat borne rabies is given by EVERLING²⁵. He deals first historically, with the epizootics among cattle and horses in South America then with the human epidemic in Trinidad and finally with the rôle of the bat in their transmission.

A short description with illustrations of a living *Desmodus rotundus rotundus* sent to Paris from the Argentine is given by ROMAÑA.²⁶ This is followed by a short note on the various species of *Desmodus* which are concerned in the transmission of rabies.

An interesting article on rabies in Trinidad and in particular on the rôle of the vampire bat in its transmission is contributed by SLIMON.²⁷

KIRK²⁸ reports that sulphanilamides appear to have no effect on rabies. Three rabbits were infected subdurally with fixed virus (Paris strain) and given 1 cc. daily of Prontosil soluble intra venously for the following six days. A fourth was kept as a control. All four rabbits were moribund by the seventh day and showed typical symptoms of paralytic rabies.

From a study of the records of 7 200 rabbits which had been infected with rabies at Tonking during a period of 5 years DODERO²⁹ finds evidence of seasonal variation. The year at Tonking is divided into 3 seasons the first from February to April when the climate is fresh and moist the second from May to October when it is hot and rainy the third from November to January when it is fresh and dry. The mean duration of incubation diminishes abruptly from April to June and rises again slowly during November and December. The curve of the mortalité precoce (that is the proportion of rabbits which die before the date at which they would ordinarily be killed for vaccine) is lowest in February and highest in October (Figs 2 and 3 of this article should be transposed.)

That the blood of animals suffering from rabies is rarely infective is well known. REMLINGER and BAILLY³⁰ in a recent experiment failed to obtain infection from the blood of 12 infected rabbits the blood being drawn at different stages of the infection and inoculated in large quantity into the muscles of the neck of guineapigs (2 in each case). The extreme rarity of positive results adds interest to two observations in which blood was taken not directly from the infected animals but from ticks which infested them, and in which infection with rabies resulted from inoculation of this minimal quantity of blood. These two positive results occurred in a series of similar experiments on 30 dogs. The ticks which were used were of the

²⁵ EVERLING (W.) *Lyssa-Übertragung durch Fledermäuse*.—*Arch f. Schiffh u. Trop Hyg* 1939 Mar Vol 43 No 3 pp 102-116 [41 refs.]

²⁶ ROMAÑA (C.) *Présentation d'un vampire vivant (Desmodus rotundus rotundus E Geoffroy)*.—*Bull. Soc. Path. Exot* 1938, Dec. 14 Vol 31 No 10 pp 885-887 With 3 figs. on 2 plates.

²⁷ SLIMON (J. G.) *Rabies Paralytica in Trinidad*.—*Jl. Roy. Nav. Med. Serv.* 1939 Apr Vol 25 No. 2 pp 142-158. With 4 figs.

²⁸ KIRK (R.) *Sulphanilamides and Rabies*. [Correspondence].—*Nature* 1939 Jan 14 Vol 143 No 3611 p 77

²⁹ DODERO (J.) *Climat tonkinois et rage expérimentale du lapin*.—*Ann. Inst. Pasteur* 1939 Jan. Vol 62, No 1 pp 121-125 With 3 figs.

³⁰ REMLINGER (P.) & BAILLY (J.) *Développement possible du virus rabique dans l'organisme de la tique du chien (Rhipicephalus sanguineus)*.—*Ann. Inst. Pasteur* 1939 Apr Vol 62, No. 4 pp. 463-467

species *Rhipicephalus sanguineus*. Similar experiments with leeches (*Limnatus nilotica*) gave negative results. The authors do not suggest that the tick may convey infection to man. It is however possible that the virus of rabies may develop in the stomach of the tick.

In a second paper²¹ the same authors discuss the paresis which may develop in man from the bite of a tick and describe experiments on rabbits and guinea-pigs in which a non-fatal paresis but not a paralysis developed after inoculation of the stomach contents of ticks which had been fed on healthy dogs.

The relationship between concentration of galactose in the urine and local reactions during anti-rabies inoculation is discussed by CRUVEILHIER, DIERYCK and VIALA.²² In the urine of 14 out of 15 persons who experienced erythema or urticaria, the concentration of galactose was increased as compared with a normal as derived from 9 persons who were unaffected by local reactions. The authors attribute this variation to a functional deficiency of the liver which gives rise to hypersensitiveness. A. G. McKendrick

²¹ REMLINGER (P.) & BAILEY (J.) Contribution à l'étude expérimentale des accidents déterminés par la tique de chien (*Rhipicephalus sanguineus*) — *Ann. Parasit. Humains et Comparés* 1939 Jan. 1 Vol. 17 No. 1 pp. 1-5

²² CRUVEILHIER (L.), DIERYCK (J.) & VIALA (C.) Nature des accidents locaux non septiques observés pendant le traitement antirabique — *Ann. Inst. Pasteur* 1939 June Vol. 62 No. 6 pp. 852-860

TRYPANOSOMIASIS

PRÉCIS OF ABSTRACTS IN THIS SECTION

The Report of the Sleeping Sickness Service of Nigeria for 1937 (p. 736) is mainly a record of administrative matters, but from an experiment on two patients it is concluded that four 2 gm doses of trypanamide did not increase the resistance of the parasites to this drug.

From a study of the 68 inhabitants of a village in Southern Rhodesia, BLAIR (p. 736) concludes that there is little evidence to support the view that *T. brucei* and *T. rhodesiensis* are identical, and that infection is not stored in a game animal reservoir. In this village there were 2 persons with *T. rhodesiensis* in the blood and tsetse flies were abundant yet other inhabitants were not infected, though European and native visitors had been infected. These visitors had either not before been exposed to tsetse or had been exposed only to low densities.

CORSON (p. 737) records chronic infection in monkeys infected with *T. gambiense* through *G. morsitans* and suggests that similar chronic infections possibly undiagnosed, may occur in man.

LEFROU and GOARNISSE (p. 738) demonstrate that in the Ivory Coast non-infected persons show very much the same ocular lesions as those infected with sleeping sickness. Optic neuritis may occur in the uninfected and in the infected before treatment but papillitis may be due to a second stage disease. It does not suddenly end in atrophy. Old cases of trypanosomiasis in adults often show complete decolouration of the papilla, and in these medication with pentavalent arsenicals undoubtedly plays a part in the production of optic atrophy.

The authors discuss other conditions in connection with the aetiology of ocular lesions

SYMES and SOUTHBY (p 740) report on the reduction of *G. palpalis* by the block method over an area of 713 acres along the shore of Lake Victoria. Hand-catching of adults was more effective than collection of pupae and trapping was ineffective. The decrease in the numbers of *G. palpalis* was from 50 to 90 per cent and the total cost about £878. Large numbers of flies cross stretches of open water 400 yards wide. Elimination was not achieved but even with high densities of fly hand-catching can be employed successfully and economically and it is hoped that eradication will soon be completed.

As a result of further observation of volunteers for experimental infection with *T. rhodesiense* CONSON (p 741) finds that they remained so well in health after completion of treatment that he now thinks that some of the complications suffered by them while treatment was in progress may have been due to the germanin used. HAWKING (p 742) found that germanin had practically no trypanocidal action on *T. rhodesiense in vitro* but that trypanosomes incubated with it and then inoculated into mice failed to infect. The amount absorbed by these trypanosomes was small. In the estimation of germanin in the blood VIERTHALER and BOSELLI (p 742) point out that the serum of small animals before administration of the drug gives some yellow colouration which varies from day to day with the reagents used. It is therefore necessary to estimate this colouration shortly before administration. The amount of germanin in the blood falls slowly and protection against subsequent infection with *T. brucei* is afforded at levels as low as 1 mgm. per 100 cc. VAN DEN BRANDEN (p 743) obtained prolonged incubation period and temporary sterilization of the blood by exposing rats to the vapour of germanin before and after *T. brucei* had appeared in the blood.

POP and BUDAC (p 743) found that anticomane has only a feeble therapeutic action in rats infected with *T. brucei* and *T. equiperdum* but that the prophylactic action was rather better though the drug must be given at the same time as the infection. Its action is directly on the parasites.

LAGODSKI (p 743) failed to protect a rabbit by a dose of p-aminophenylstibimate of methylglucamine against subsequent infection by an arsenic resistant strain of *T. annamense* but there was a definite influence in attenuating the virulence and pathogenic power of the parasite.

VAN DEN BRANDEN (p 744) concludes that astreptine has no action on rats infected with *T. brucei*. The sulphate of ortho-oxo-quinoline has some trypanocidal action *in vitro*.

LAUNOY (p 744) found in mice that a single dose of 4 cgm. orsanine was more lethal than the same amount given in 3 separate doses at 4 and 3 hours interval. A large single dose effected more cures in mice infected with *T. brucei* than the same amount spread over several doses, and the longer the intervals the less was the efficacy of the drug. He considers that similar tests should be made in man.

MANNOZZI TORINI (p 745) gives a method depending on the differential centrifuging of blood containing trypanosomes and diluted with citrate-saline for obtaining an emulsion of living trypanosomes for experimental work. He (p 745) showed that proteolysis occurred in a mixture of *T. evansi* and casein on incubation at pH 5.9.

ROUBAUD and PROVOST (p. 746) observed that the growth of three young mice infected with *T. gambiense* was arrested especially one which lived for 5 months after infection. Infantilism has been recorded in infections with *T. evansi*.

NICOLLE and SIKORS (p. 746) observed that the sedimentation rate in guinea-pigs infected with *T. equiperdum*, *T. brucei* and *T. evansi* was increased. YORKE in comment thinks that this phenomenon is to be related to the auto-agglutination which he has shown to take place in trypanosomes if the blood is cooled.

FRENCH (p. 747) working with *T. congolense* and *T. brucei* in animals finds a sharp fall in blood sugar before a crisis or death. Acidosis exists and increases before death and blood lactic acid increases.

BIRKS (p. 747) shows that there is considerable difference in the susceptibility of individual small laboratory animals to *T. congolense* and that different strains of the trypanosome appear to vary in pathogenicity. Conclusions drawn from a small number of inoculations therefore are likely to be fallacious.

DELIDIMITRIOU (p. 747) obtained hopeful results in the treatment of 270 cattle with surfen C. The infection was with *T. congolense*. VAN SACZGHEM (p. 748) also reports favourably on surfen C given intramuscularly in doses of 1 gm per 100 kilo in cattle. This may be repeated after 5 days. The drug acts better in *T. congolense* than in *T. evansi* infection.

T. equiperdum multiplies readily in rabbit's testicles and lesions develop in 4-8 days. SOLDANI (p. 748) makes use of this fact for the diagnosis of dourine when trypanosomes may be difficult to find. He inoculates the blood or better serous fluid from the genital lesions into the testicles of a rabbit. For purposes of diagnosis he prefers this method to the intrapalpebral reaction of Lanfranchi and Soudi, the formolgel or the complement fixation test.

ZWEIMER and CLIBERTSON (p. 748) noting the similarity between the terminal spazms in rats infected with pathogenic trypanosomes and those observed in cases of potassium poisoning examined the serum potassium level throughout the course of infection of these animals with *T. equiperdum* and found that there is a marked increase beginning 24 hours or so before death. They infer that this is the direct cause of death rather than an endotoxin, a hypoglycaemia or asphyxia.

POINDENTER (p. 748) notes that young rats respond to *T. equiperdum* infection by increase of mononuclear leucocytes more readily than do older animals. This trypanosome was rendered avirulent if not actually killed, in 20-30 minutes when subjected to a temperature of 41°C.

HOLMER and RULE (p. 749) found that sulphamamide orally or intravenously was ineffective in the treatment of rats infected with *T. equiperdum*.

JALFREY (p. 749) found that antiplague vaccination of cattle in Cambodia produced rise of temperature which in 5 per cent. of some thousands of cattle over 8 years old, was accompanied by the presence of *T. evansi*. This, however, reacted readily to naganol. It is inferred that these cattle are a reservoir of *T. evansi*.

LLOVEROL (p. 749) reports good results from treating sheep inoculated with *T. dimorphum* with 15-20 cc. of normal *Cynocephalus* serum. In debilitated animals there is grave risk in applying such treatment.

DUCA (p 750) investigated the cause of susceptibility of young rats to *T lewisi* as compared with older rats. This infection was found to be highly pathogenic for rats less than 25 days old and survivors showed a marked leucocytosis and monocytosis. In fatal cases there was marked secondary anaemia but absence of this leucocyte response. CULBERTSON and KESSLER (p 750) rendered rats—the older more easily than the young—resistant to *T lewisi* by repeated injection of formalized homologous antigen. CULBERTSON (p 751) observed that when germanin was injected into nursing rats infected with *T equiperdum* the parasites were observable for 30–36 hours whereas in older rats they disappeared within 15 hours owing it is believed to the reticulo-endothelial response by way of which the drug is thought to act.

He (p 751) finds that resistance to *T lewisi* infection is conferred upon young rats nursed by a mother who has been passively immunized after parturition. The same author (p 751) found that specific antiserum given *per os* (0.5 cc per 10 gm body weight) imparts to young rats resistance to infection by *T lewisi*. This resistance diminishes with age and in old rats is nil. It may be that the intestine becomes impermeable to the antibody or denaturizes it. He again (p 752) in order to ascertain whether increased resistance with age of the subject (man and animals) was due to enhanced reaction on the part of protective cells inoculated rats ranging in age from 6 to 60 days with 1 per cent trypan blue killed them 18 hours later and examined the phagocytic activities of the tissue cells. The only variations worth noting were in the liver—the Kupffer cells in the older rats revealed a much greater phagocytic activity than those in the younger. The author takes this as answering his query in the positive.

MAZZA and his colleagues (p 752) in a series of papers record cases of Chagas disease in various parts of the Chaco country and have noted that a fairly large proportion of *Triatoma infestans* caught in the dwelling were infected.

BRUMPT (p 753) brings further experimental evidence to support the view that it is by way of the excreta and not by bite that reduviid bugs transmit *T cruzi* infection.

PIFANO (p 753) on the ground that *Psammolestes arthurii* a reduviid bug of Venezuela is easily infected experimentally with *T cruzi* thinks it may possibly be a natural transmitter. This insect has not yet been found outside Venezuela. FERREIRA and DEANE (p 754) made analogous observations regarding the Hemiptera *Clerada apicicornis* which is widely distributed in the Amazon estuary where many animals are found naturally infected with *T cruzi*.

DEANE and JANSEN (p 754) have found a small opossum *Marmosa cinerea* a reservoir host of *T cruzi* in the State of Pará.

TALICE and RIAL (p 754) report yet another case—this is called the twentieth—of Chagas disease in Uruguay.

KOLODNY (p 755) has carried out, with *T cruzi* investigations analogous with those of CULBERTSON on *T lewisi* (v.s.) regarding the increasing resistance of rats with age. Susceptibility is marked to the time of weaning (25–35 days) after which resistance is observed and increases to a maximum at maturity though still existent through life. This is not due to any specific antibody because injection of the serum of normal adult rats did not affect the course of infection in young susceptible animals. The resistance is present whether infection is *per os* or by the peritoneum. The same author (p 755) has observed

that with *T. cruzi* (as has been noticed with diphtheria toxin in guinea pigs, and the viruses of encephalitis and endemic typhus in mice) young rats suffer less in the summer than in the autumn winter and early spring.

ROMANA (p. 756) has produced his sign experimentally by conjunctival deposition of the faeces of an infected *Rhodnius prolixus*.

H H S

NIGERIA. REPORT ON THE MEDICAL SERVICES FOR THE YEAR 1937
[BRIERCLIFFE (R.) Director] Appendix B pp. 67-73—Report
of the Sleeping Sickness Service, 1937

The year 1937 has been a period of transition. The Colonial Development Fund is providing £19 000 per annum for five years for sleeping sickness control measures on the understanding that Nigeria provides a further £11 000 for the expansion and improvement of treatment in addition to maintaining the normal running of the service. The appointment of a second entomologist and ten sleeping sickness control officers was approved, and the entomologist five of the control officers and a foreman arrived in October. Six of the eight R.A.M.C. British Non-Commissioned Officers who were to take over the sleeping sickness teams arrived towards the end of the year. While the new officers were being trained, work was continued on the same lines as in 1936.

Owing to shortage of staff, it was rarely possible to keep more than one officer at Gadam. A full programme of entomological work has been continued there and some chemotherapeutic research has been done. The experiment on trypanamide resistance referred to in the 1936 report has been continued. Thirty monkeys were injected with blood from untreated sleeping sickness cases and after the patients had received four 2 gm. injections of trypanamide another series of monkeys was inoculated from them. In two instances the strain was isolated both before and after treatment. The characteristics of the two strains have been studied but no significant differences could be detected, from which it is concluded that in these two patients four 2 gm. doses of trypanamide did not increase the resistance of the parasite to the drug.

Owing to the absence of the entomologist from Gadam, there has been no opportunity of working out the research data which had been accumulating. The report concludes with certain remarks on therapeutic measures, sleeping sickness control and the Anchan Settlement Scheme.

W. Yorks

BLAIR (D. M.) Human Trypanosomiasis in Southern Rhodesia, 1911-1938.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939, Apr. 6, Vol. 32, No. 6 pp. 729-742. With 1 map. [10 refs.]

The paper commences with a description of the history of tsetse fly occupation in Southern Rhodesia, the position today and the outlook for the future. The author then deals with the history of human trypanosomiasis in Southern Rhodesia and with the events leading up to the 1934 Medical Survey. Cases of human trypanosomiasis reported in Southern Rhodesia from 1909 to 1938 are shown in a table. In all there have been eight European cases with six deaths, and 45 native cases with 29 deaths.

Special reference is made to the state of affairs in the Gowe district. This is a thickly wooded river plain situated at the junction of the Umnati and Msongwa rivers. It has a large and varied game population and was always heavily infested with tsetse. When the author visited it in 1935 he found the tsetse not only in the surrounding bush but right in among the huts of the village where they proved extremely troublesome. This is not a usual finding in villages of similar size situated in fly areas and Blair believes that it has an important bearing on the epidemiology of sleeping sickness in Southern Rhodesia. The present inhabitants settled in Gowe in 1930 having moved from a site about 25 miles to the south and the community now consists of 5 alien native fishing boys and indigenous natives comprising 8 adult males, 25 females and 28 children. Their communal health had on the whole been good, and there was no record of outstanding mortality.

On the afternoon of his arrival the author examined the whole population but because of the annoyance caused by the tsetse fly material secured was not examined on the spot but taken to Robb's Drift. Two so-called carrier cases of trypanosomiasis were discovered, viz. Kahondera the headman of the village and Zarro a middle-aged male. Blood films in each case showed a heavy infection with *T. rhodesiense*, *P. falciparum* and *Microfilaria perstans*. Neither patient apparently gave any definite history of illness. Details are given of a number of cases which can be directly connected to the Gowe focus.

Summarizing his experience at Gowe the author concludes that it lends little support to the view that *T. brucei* and *T. rhodesiense* are the same organism. Blair believes that a local outbreak of the disease always follows the establishment of the man fly man cycle and that the infection is not stored in a game animal reservoir but in a human reservoir. In the case of Kahondera the trypanosomes were present in the peripheral circulation at every examination and in relatively large numbers so that he would act as an extremely efficient reservoir. The genesis of the carrier state is a very interesting problem. Kahondera's trypanosome had the virulence and lethal effect on experimental animals associated with *T. rhodesiense* infections. If it is presumed that Kahondera and Zarro infected the village tsetse the flies were apparently unable to produce any acute cases of the disease in the other inhabitants of the village and yet they were able to infect quite a large proportion of the casual visitors to the village both European and native these visitors being individuals who had either never been exposed to tsetse before or only exposed to low fly densities. The paper concludes with certain speculations on the explanation of carriers.

W. Y.

CORSON (J. F.) A Final Note on a Strain of *Trypanosoma gambiense* transmitted through Monkeys by *Glossina morsitans*—*Ann. Trop. Med. & Parasit.* 1939 Mar 31 Vol. 33 No. 1 pp. 91-93

This note concludes Corson's observations on the strain of *T. gambiense* transmitted through monkeys by *G. morsitans* [this *Bulletin* 1937 Vol. 34 p. 921 and 1939 Vol. 36 p. 208]. Attention is drawn to one or two errors in the table of the third note viz. monkey 115 had lived for 238 days instead of 537 as stated and monkey 110 had lived for 202 days and not for 501. About the end of 1938 Corson decided to end the experiment by chloroforming the remaining monkeys.

and examining the cerebrospinal fluid macroscopically. The results are shown in a table. Details are given of 13 monkeys, which lived for periods varying from 289 to 1 174 days after inoculation. Trypanosomes were found in the cerebrospinal fluid of five of these monkeys and the cell count was considerably increased in all except one. It is interesting to note that the findings in the monkey which lived 1 174 days were trypanosomes 50 and white cells 640. Corson states that the interest of such infections in susceptible monkeys is that they suggest that similar chronic infections, possibly undiagnosed, may occur in man. W I

LEFFOT (G) & GOARNISSON (J) Les lésions oculaires chez les noirs trypanosomés avant tout traitement. L'importance des carences alimentaires. [Ocular Lesions in Natives Infected with Trypanosomes before Treatment the Importance of Alimentary Defects.]—*Bull. Soc. Path. Exot.* 1939 Apr 4 Vol. 32, No 4 pp. 424-437

It appeared to the authors, who wished to study systematically the lesions occurring in the depth of the eye during treatment of sleeping sickness that it was essential to know first what changes were found before any treatment was administered.

The authors carried out their work at Onagadougou in the Mossi country of the Ivory Coast. They examined 1 232 cases of sleeping sickness—425 new and 807 old cases. The latter had in general received only one course of atoxyl or trypanamide in 1935. As a control the eyes of 537 persons not suffering from trypanosomiasis were also examined. The difficulties confronting ophthalmoscopic examination of natives are mentioned, and the manner in which these difficulties were overcome is discussed. The results of the investigation are summarized in a table in which the nature of the lesions, the period of the disease and the sex and age period (man, woman or child) are given. These tables are so interesting that they are reproduced here.

Results of Ocular Examinations of Trypanosomal and Non-Trypanosomal Natives

Not Infected

	1st Period			2nd Period			Total	Percent.
	M	W	C	M	W	C		
Slight pallor	23	8	29	—	—	—	60	11.1
Complete decoloration	6	1	2	—	—	—	9	1.6
Papillitis	6	10	5	—	—	—	21	3.9
Chorio-retinitis	11	6	7	—	—	—	24	4.4
Synchysis	2	1	0	—	—	—	3	0.53
Intis	2	1	0	—	—	—	3	0.53
Total	50	27	43	—	—	—	120	22.3
Examined	170	146	221	—	—	—	537	—
Total examined	537			—				

New Cases

	1st Period			2nd Period			Total	Per cent.
	M	W	C	M	W	C		
Slight pallor	9	19	30	10	9	10	87	20.4
Complete decolouration	3	3	3	0	1	1	11	2.5
Papillitis	1	6	6	5	4	4	26	6.1
Chorio-retinitis	1	2	0	4	1	0	8	1.8
Synchysis	1	0	2	0	0	0	3	0.7
Total	15	30	41	19	15	15	135	31.7
Examined	60	114	129	41	42	39	425	—
Total examined	303			122				

Old Cases

	1st Period			2nd Period			Total	Per cent.
	M	W	C	M	W	C		
Slight pallor	32	19	32	15	3	9	110	13.6
Complete decolouration	13	7	1	5	2	1	29	3.5
Papillitis	5	4	2	1	0	0	12	1.4
Chorio-retinitis	4	2	0	0	1	1	8	0.9
Synchysis	1	1	0	0	0	0	2	0.2
Iritis	1	0	0	1	0	0	2	0.2
Total	56	33	35	22	6	11	163	20.1
Examined	248	204	184	67	46	58	807	—
Total examined	636			171				

It will be seen that the non infected persons show very much the same lesions as those infected with trypanosomes. Women exhibit slight pallor of the papilla much less frequently than men and children and complete decolouration indicative of optic atrophy is more common in men than in women and children.

The evolution of the disease towards the second stage seems to exert a special influence on the appearance of papillitis contrary however to general opinion this early stage of optic neuritis does not suddenly end in atrophy the latter lesion is much less frequent than the former. Attention is drawn to the fact that papillitis is rare in old treated cases. Optic neuritis is often only a manifestation of a localized meningitis of the sheath of the optic nerve.

There is a trypanosomal papillary neuritis just as there is a syphilitic papillary neuritis. As this neuritis is not associated with diminution of visual acuity and can only be recognized by the ophthalmoscope it is often unnoticed.

Old cases of trypanosomiasis in adults exhibit more frequently complete decolouration and in these medication with the pentavalent arsenicals undoubtedly plays a part in the production of the optic atrophy, the optic nerves of adults being much more sensitive than those of children. Recent cases showed pallor in 20.4 per cent. of cases, complete decolouration in 2.6 per cent., papillitis in 6.1 per cent. and chorio-retinitis in 1.8 per cent. Old cases showed slight pallor in 13.6 per cent., complete decolouration in 3.5 per cent., papillitis in 1.4 per cent. and chorio-retinitis in 0.9 per cent. In all 31.7 per cent. of recent cases and 30.1 per cent. of old cases exhibited ocular lesions.

The general conclusion appears to be firstly that before any treatment sleeping sickness patients may present ocular lesions, particularly optic neuritis, and secondly that such lesions are not necessarily pathognomonic since they are found in non infected cases.

The remainder of the paper is concerned with a discussion regarding the aetiology of the ocular lesions. The authors consider the possible influence of syphilis and of filarial and other helminthic infestations. They then go on to the question of nutritional deficiencies, and state that they are very inclined to think that in Mosen the minor signs of optic neuritis such as a simple pallor of the papilla are due principally to defects of diet which appears to be particularly poor in vitamin C and to a less extent in vitamin A. The paper should be consulted in the original by those interested.

II* Y

SYMES (C. B.) & SOUTHERN (R.) The Reduction of *G. palpalis* in a Lake Shore Area by the "Block" Method.—Fol. 4+32 pp. With 4 folding diagrams, 1 map & 22 photographs. 1938. Nairobi. [Summarized in *Rev. Applied Entom.* Ser. B. 1939. May. Vol. 27. Pt. 5. pp. 63-69.]

"A detailed account is given of an experiment carried out between March 1935 and September 1937 in which an attempt was made to eliminate *Glossina palpalis* R.-D. from an area along the shore of Lake Victoria in Kenya Colony by the "block" method which had been used successfully along infested rivers. Brief notes are given on the topography, vegetation, climate and fauna of the area and on the incidence of sleeping sickness and the habits of the population. Descriptions of the 8 clearings include their locations, dimensions, the type of original bush that had to be cleared, the cost and progress of clearing and their present state. The technique used for reducing the fly is outlined, and descriptions are given of each block together with the details of the measures carried out and the results obtained. Points of interest relating to trapping, to the bionomics of *G. palpalis* and of *G. pallidipes* Aust. and *G. brevipalpis* Newst. the two other species of tsetse fly found in the area, and to the recovery of the fly population after reduction by collection of adults and pupae are discussed.

"The following is taken from the authors' summary and conclusions. A total area of 713 acres was cleared at a cost of approximately £900. The amount of clearing was about twice as much as that necessary for isolating the infested blocks of bush, the extra clearing being undertaken to facilitate early settlement and agricultural production. Fly reduction was accomplished by hand-catching of adults, collection of pupae and trapping. The first method was the most economical, the second was much more costly, and the last was ineffective. The

decrease brought about in the numbers of *G. palpalis* on the mainland varied between approximately 50 and 90 per cent. the small fly population on Hanete Island was practically eliminated in 3½ months. The total cost of fly reduction measures excluding the nominal value of traps was approximately £878. Data collected indicate that *G. palpalis* can maintain itself at a low density by breeding in sugar-cane and banana plantations. Its pupal period in the area concerned lasts 43-53 days. The season of its maximum activity is from April to June and that of maximum reproduction from April to September. Considerable movement of fly occurs along the shore and between the mainland and islands and although this is aided by pedestrian and canoe traffic, large numbers of flies cross stretches of open water as much as 400 yards wide. The periods of maximum adult activity and maximum reproduction in *G. pallidipes* and *G. brevipalpis* occur at the same time as those of *G. palpalis*. Settlement and development have progressed satisfactorily. Elimination was not achieved, but the reduction accomplished and the experience gained indicate that even with high densities of fly hand-catching can be employed successfully and economically. It is hoped that the eradication of *G. palpalis* in this area will be completed in the near future.

CORSON (J. F.) A Further Note on Some African Volunteers in Experimental Work with *Trypanosoma rhodesiense*—*Ann Trop Med & Parasit* 1939 Mar 31 Vol. 33 No 1 pp 97-99

In a recent note [this *Bulletin* 1939 Vol. 36 p 667] the author recorded a somewhat high incidence of various illnesses in Africans who had volunteered for experimental infection with *T. rhodesiense*. These illnesses occurred during or after treatment with germanin both in patients who had become infected and in others who had resisted. The author concluded that there was no reason to attribute these complications except albuminuria, to the action of germanin or to infection with *T. rhodesiense* and suggested that such illnesses were not exceptional in the local population to which the volunteers belonged. Since writing the above about the middle of October 1938 the author was able to see nearly all the volunteers weekly up to February 1939 when the present note was written.

Of the original 43 1 had died and 4 had left the district. Of the remaining 38 only 3 had anything more than trivial disturbances of health. One of these had diarrhoea in October and a short attack of acute bronchitis with fever in November. The second had diarrhoea and an undiagnosed fever of four days duration in November and the third suffered from pain in his left foot which lasted nearly a month. The last case is of interest because a few other volunteers had complained of similar pains during or soon after treatment and one had obviously suffered from very severe pain. LESTER [this *Bulletin* 1937 Vol. 34 p 521] reported mild peripheral neuritis after the administration of germanin and thought the drug had caused it.

Excluding such infections as malaria, relapsing fever, schistosomiasis, filariasis, abscess and venereal disease 13 of the volunteers were recorded in the previous paper as having had some disturbance of health during or soon after their course of treatment of germanin. The 38 volunteers who have been under close observation during the

last few months have kept so well in health that Conson is now doubtful whether germanin did not play some part in the production of these illnesses. IV Y

HAWKING (Frank) Contribution on the Mode of Action of Germanin (Bayer 206) — *Ann. Trop. Med. & Parasit.* 1939 Mar 31 Vol. 33, No. 1 pp 13-19 [12 refs.]

The object of this paper is to describe *in vitro* experiments upon the trypanocidal action of germanin with a view to comparing the behaviour of this compound with that of the trivalent arsenicals and acriflavine. The trypanosomes used were the reviewer's strain of *T. rhodesiensis* and the same parasite made resistant to germanin by means of Jancsó's technique.

It was found that germanin had practically no trypanocidal action *in vitro* but that if normal trypanosomes are incubated with it *in vitro* and then washed and inoculated into mice they fail to infect. Germanin-fast trypanosomes do not lose their infectivity under these conditions. The amount of germanin absorbed by the trypanosomes *in vitro* as judged by ~~concentration~~ estimation, is small and no difference was detected between normal and resistant trypanosomes in this respect. IV Y

VERTHALER (R. W.) & BOWELL (A.) D. F. [Übung kleinster Germaninmengen im Kaninchenblut als Schutz gegen eine Infektion mit *Trypanosoma brucei*] — [The Significance of the Smallest Doses of Germanin in Rabbit Blood as a Protection against Infection with *T. brucei*] — *Arch. f. Schiffs- u. Trop. Hyg.* 1939 Apr Vol 43 No. 4 pp 149-160 With 5 figs.

Lang's method for the estimation of germanin in blood, as improved by Dangerfield, Gaunt, and Wormald, was examined by the present authors and found to be of value both in the case of plasma and serum. A number of parallel estimations made in the plasma and serum of different samples of blood did not give identical results sometimes the plasma values were a little higher than those of the serum and sometimes the reverse was the case.

Attention is drawn to the fact that the serum of small animals before the administration of germanin gives a certain amount of yellow colouration with the reagents. This is supposed to be due to amines produced in the blood by hydrolysis. The blank value (Blindwert) varies not only in different rats and rabbits, but also in the same animals on different occasions. The variation noticed in one rabbit on different days amounted to 0.72 mgm. per 100 gm. It follows, therefore that estimation of germanin by the method in question can only be accurate if the blank value is obtained shortly before the drug is given.

The authors give curves showing the amount of germanin found in the blood of rabbits at various periods from 5 minutes up to 10 days after the administration of 10 mgm 4.5 mgm 3.5 mgm. and 2.5 mgm. per kilo of body weight respectively. Having ascertained these values they then proceeded to inoculate a considerable number of rabbits with *T. brucei* at periods when the concentration of drug in the serum was estimated to be at levels falling as low as 1 mgm per 100 cc. All the rabbits were protected. [See also this *Bulletin* 1938, Vol. 35 p 714.] IV Y

VAN DEN BRANDEN (F) Etude de l'action des vapeurs de "Bayer 205" sur le rat blanc infecté de trypanosome (Brucei) [Study of the Action of the Vapour of Bayer 205 on Rats Infected with *T. brucei*].—*Ann Soc Belge de Méd Trop* 1938. Sept 30 Vol 18. No 3 pp. 515-522. With 1 fig

A description of the technique and apparatus used is given. The solutions vapourized consisted of 40 cc. of a 5 or 10 per cent solution of the drug. In all 14 animals were used in the experiments. In animals treated in this way before trypanosomes appeared in the blood the incubation period was prolonged for 4 to 15 days. No animal in which the parasites were present in the blood when treatment commenced were cured but temporary blood sterilization was obtained.

H Y

POP (A) & BUDAC (O) Le traitement du nagana et de la dourine expérimentale chez le rat par l'anticoman [The Treatment of Nagana and Dourine in the Rat by Anticomman].—*C R Soc Biol* 1938. Vol 129 No 34 pp 1229-1232.

The authors have repeated the work of SCHERN and ARTAGAVEYTIA ALLENDE on the trypanocidal action of anticoman [This substance is a mixture of synthalin bitartrate pancreas powder sodium phosphate tannic acid and bismuth subnitrate. It was found to be less toxic than synthalin alone. For previous work on this subject see this *Bulletin* 1936 Vol 33 p 204 and 1937 Vol 34 pp 192 553].

Pop and Budac administered the compound in suspension subcutaneously in rats infected with *T. brucei* and *T. equiperdum*. They found that its therapeutic action was but feeble maximal doses only sufficing to produce a certain proportion of cures. The prophylactic action was rather better but it was necessary to give the compound at the same time as the trypanosomes were injected. It is concluded that anticoman acts directly on the parasites and not by producing a hypoglycaemia—a conclusion reached some time ago by the reviewer and his colleagues who proved that the action of synthalin and allied compounds is direct [This *Bulletin* 1938 Vol. 35 p 342 and 343].

H Y

LAGODSKY (H) Atténuation de la virulence et du pouvoir pathogène d'un trypanosome (*T. annamense* chimio-résistant) après passage dans un organisme animal traité par Sb [Attenuation of the Virulence and Pathogenic Action of a Trypanosome (an Arsenio-Resistant Strain of *T. annamense*) after Passage through an Animal treated with Antimony].—*Bull Soc Path Exot* 1939 Jan. 11 Vol 32. No 1 pp 35-38

The observations recorded in this paper began with a rabbit which was given a preventive dose of a pentavalent antimonial viz. p aminophenylstibinate of methylglucamine followed 6 hours later by an injection of five million arsenic resistant *T. annamense*. On the ninth day the rabbit's blood was positive but it never exhibited any of the usual external signs of disease although the blood was always positive up to the time it was sacrificed on the 35th day.

On different occasions two guineapigs a mouse and Rabbit 2 were subinoculated from Rabbit 1. One of the guineapigs recovered

spontaneously and the blood of the others was cleared by a dose of tryparsamide. The mouse died of the infection in four days. Rabbit 2 became infected but resisted tryparsamide treatment. It likewise never developed external lesions up to the time it was killed. The strain was passed on through two other rabbits from which guinea pigs, mice and Rabbit 5 were inoculated. It apparently continued to exhibit the same characters.

The author concludes from this that although the prophylactic dose of the antimonial had no preventive action nevertheless it had a definite influence on the parasite in that it attenuated its virulence and its pathogenic power. H 1

VAN DEN BRANDEN (F) Recherche sur l'action de l'astreptine Meurice (P-aminophénol-sulfonamide) sur le *Trypanosoma Brucei*. [The Action of P Aminophenol Sulphonamide on *T. brucei*—*Ann. Soc. Belg. de Méd. Trop.* 1938. Dec. 31 Vol 18 No 4 pp 663-694]

The conclusion reached is that astreptine (p. aminophenol sulphonamide) has no action on rats infected with *T. brucei*. H 1

VAN DEN BRANDEN (F) Le sulfate d'ortho-oxy-quinoléine (chinosol-sunoxol) a-t-il une action in vitro sur des rats blancs infectés de *Trypanosoma "Brucei"*? [Has the Sulphate of Ortho-Oxy-Quinolone any Action on Rats infected with *T. brucei*?]—*Ann. Soc. Belg. de Méd. Trop.* 1938. Dec. 31 Vol 18. No. 4 pp. 695-698.

It was found that although this substance had no therapeutic action on rats infected with *T. brucei* it had some trypanocidal action in vitro. H 1

LATOUR (L) Résultats de l'application des doses médicamenteuses réfractées injectées à courts intervalles dans les trypanosomoses expérimentales. [The Results of the Administration of Fractional Doses of Drugs at Short Intervals in the Treatment of Experimental Trypanosomiasis.]—*Bull. Acad. Méd.* 1939 Apr 18. 103rd Year 3rd Ser Vol 121 No 14 pp. 550-556

Whilst the object of the experimenter and the clinician in the treatment of trypanosomiasis is the same i.e. the sterilization of the infection the conditions under which they work are different. The experimenter can take risks, but the clinician cannot run the risk of poisoning his patient.

The author has conducted a long series of experiments on mice with the objects, firstly of ascertaining whether the frequent administration of fractional doses is less toxic than the administration of the whole dose at once and secondly whether such a procedure is as effective from the therapeutic point of view. The toxicity experiments were performed on normal mice groups of at least 20 animals being used in each observation, and the therapeutic experiments on mice infected with *T. brucei*. The drugs employed were orsanine and the trivalent antimonial compound "anthiomaline".

In the toxicity experiments with orsanine it was found that when 4 cgm. was given at a single injection 11 of 20 mice died, but when this dose was divided into 3 fractional doses (1.0 1.5 and 1.5 cgm.

respectively) given at intervals of 4 and 3 hours only 5 of the 20 died. Similar results were obtained with the antimony compound

In the therapeutic experiments with orsanine it was found that a single dose of 3 mgm cured 100 per cent of mice.

Fractional doses of 1 mgm given 24 28 32 and 48 hours respectively after infection cured 27 of 28 mice three similar fractional doses given at the 24th 28th and 32nd hours cured all of 7 mice. When the interval between the injection of the fractional doses was increased to 24 hours the number of cures fell to 50 per cent and when it was still further increased to 48 or 72 hours the number of cures fell progressively to nil. The results with the antimonial, although not quite so clear-cut showed the same thing

From this work Launoy considers that a case is established for testing the method on man

H Y

MANNOZZI TORINI (Manno) Una tecnica per la separazione dei tripanosomi dal sangue circolante e preparazione di emulsioni di tripanosomi. [A Technique for the Separation of Trypanosomes from the Blood and the Preparation of an Emulsion of Trypanosomes.]—*Boll Istituto Sieroterap Milanese* 1938. Dec Vol 17 No. 12. pp.824-829 With 1 plate. German summary (6 lines)

The blood should be rich in trypanosomes and the author uses that of a guinea pig at 8-10 days after intraperitoneal injection of 4-5 cc. of infected blood. This gives 60-70 trypanosomes to 250-300 red cells.

Heart blood is diluted with twice its volume of a 1 in 10 mixture of 4 per cent citrate in 0.8 per cent saline. This is centrifuged for not less than 4 minutes at 1,800 revolutions per minute. The red and white cells are spun down but the trypanosomes remain in the supernatant fluid. This fluid is aspirated in one operation into a Pasteur pipette big enough to hold it all. It is then centrifuged at 4,000-5,000 r.p.m. for 4 minutes. This throws down all the trypanosomes and the clear supernatant fluid is pipetted off. The sediment though sometimes consisting of trypanosomes only more often contains a lower stratum of red cells. It is therefore suspended in 10-15 cc. 0.8 per cent. saline and spun for 3 minutes at 1,800 r.p.m. The red cells are sedimented and the trypanosomes remain in the supernatant fluid which is pipetted off and again spun as before at the high velocity.

The sediment consists only of trypanosomes and in saline forms the optimum material for the study of the physiology and biochemistry of the trypanosomes which are still alive.

Repetition of the process will eliminate all proteins and other substances contained in the plasma.

C W

MANNOZZI TORINI (Manno) Studio di un fermento proteolitico nel tripanosoma della surra (Evansi) [Studies on a Proteolytic Ferment of *T. evansi*].—*Boll Istituto Sieroterap Milanese* 1938. Dec Vol 17 No 12. pp. 830-838. With 3 graphs. [13 refs.] English summary (9 lines)

The author has tested suspensions of *T. evansi* prepared by the method described above for proteolytic enzymes using casein gelatin and serum. Mixtures of 2 cc. casein (0.5 per cent.) 2 cc. acetic or phosphate buffer at various pH values 2 cc. emulsion of trypanosomes

and 0.25 cc. chloroform are incubated at 38° for 24 hours. The proteins are precipitated and the non-precipitable N is determined by the Kjeldahl method. The result is compared with a determination made on a control mixture without incubation.

It was found that proteolysis occurred especially at pH 5.9 and that the protease was inactivated by heat at 70°C. for 20 minutes. Activity with gelatin and serum proteins, though present was only slight
C IV

ROUBAUD (E.) & PROVOST (A.) Arrêt de croissance au cours d'infections à *Trypanosoma gambiense* chez la souris. [Arrest of Growth in Mice Infected with *T. gambiense*].—*Bull. Soc. Path. Exot.* 1939 Apr 4 Vol. 32 No. 4 pp 387-390 With 2 figs.

The strain used was isolated in Cameroons in 1934 and has since been maintained in guinea-pigs. In subinoculated mice the infections were chronic and irregular. In order to increase the virulence 4 young mice about 1 month old were inoculated with the guinea-pig strain on 2nd September 1938. One died on 4th October without exhibiting trypanosomes in its blood. A detailed history of the other 3 is given. Two died early in October but the third lived until 2nd February 1939. The most interesting feature about these mice is that their growth appeared to have been arrested. This was particularly noticeable in the case of the third animal, which lived until it was 6 months old (5 months after infection). It weighed only 9 gm. and there was great enlargement of the spleen, liver and thyroid.

The authors recall the infantism which Chagas attributed to infections with *T. cruzi* and wonder whether the phenomenon they have observed is related to it.
W Y

NICOLLE (P.) & SIMON (H.) La vitesse de sédimentation des hématies dans les trypanosomoses expérimentales du cobaye. [The Sedimentation Rate of the Red Cells in Experimental Trypanosomiasis of the Guinea-pig].—*Bull. Soc. Path. Exot.* 1939 Jan 11 Vol. 32 No. 1 pp 94-103

Having studied the sedimentation rate of the red cells in guinea-pigs infected with murine typhus, and having found that it was considerably increased at the beginning of the infection reaching its maximum and then decreasing rather quickly, it occurred to the authors that they might examine the phenomenon in guinea-pigs infected with *T. equiperdum*, *T. brucei* and *T. cruzi*. The technique used was that employed in the earlier work.

Details are given of observations on a considerable series of infected guinea-pigs. In all the animals the sedimentation rate was definitely increased. [Probably this is to be related to the auto-agglutination of red cells—a phenomenon well known in trypanosomiasis of man and animals. It was examined by the reviewer nearly 30 years ago—he found that the plasma and serum of infected man and animals contain an autoagglutinin which agglutinates the erythrocytes at low temperatures, but not at blood temperature. If the citrated blood of an infected rabbit is put in a watch glass and the temperature lowered to 5°C. or less, the red cells agglutinate strongly and sediment in a few minutes.]
W Y

FRENCH (M H) Studies in Animal Trypanosomiasis V Some Disturbances of the Host's Carbohydrate Metabolism Induced by *Trypanosoma congolense* and *Trypanosoma brucei*—*Jl Comp Path & Therap* 1938. Dec. Vol. 51 Pt 4 pp 269-281 [39 refs.]

The author has examined the sugar and lactic acid values and the CO_2 -capacity of the blood of oxen, sheep and donkeys infected with *T. congolense* and *T. brucei*. His conclusions are as follows—

(1) There is no gradual development of hypoglycaemia during *T. congolense* and *T. brucei* infections of large animals, but a sharp fall in the blood sugar level occurs shortly before death or crisis. In animals that are treated or recover without therapeutic aid, the blood sugar level returns to normal immediately crisis is passed.

(2) The CO_2 -capacity appears to fall as soon as the incubation period is over. A further drop usually occurs towards the end of the infection. It can be considered that an acidosis exists during infection and then becomes more pronounced as death approaches.

(3) Blood lactic acid values increase in the premortal stages and near crisis.

(4) A marked carbohydrate disturbance is caused in the host by pathogenic trypanosomes, but its mechanism has not yet been elucidated clearly.

[See also this *Bulletin* 1938 Vol. 35 p 712 1939 Vol. 36 pp 215 216.] II Y

BINNS (H R.) Observations on the Behaviour in Laboratory Animals of *Trypanosoma congolense* Broden, 1904—*Ann Trop Med & Parasit* 1938. Dec. 21 Vol. 32 No 4 pp 425-430

BLACKLOCK and YORKE [this *Bulletin* 1914 Vol 3 p 169] have drawn attention to the fallibility of conclusions regarding the pathogenicity of *T. congolense* drawn from a small number of inoculations, and to the danger of differentiating strains or species of trypanosomes on the results of such pathogenicity tests. The purpose of the present note is to record the results of the inoculation of small laboratory animals mainly white rats with *T. congolense* causing disease of cattle in the southern province of Nyasaland.

The results of inoculation of seven strains of this trypanosome into laboratory animals are summarized in a table which shows that there is a considerable difference in the susceptibility of individual animals to the parasites and that different strains of *T. congolense* appear to vary in pathogenicity. It is considered that the observations recorded in this communication give strong support to the conclusions of Blacklock and Yorke. II Y

DELIDIMITRIOU (G) Note sur le traitement de la trypanosomiase à congolense par le Surfen C Bayer [Note on the Treatment of *T. congolense* by Surfen C.]—*Ann Soc Belge de Méd Trop* 1938 Dec. 31 Vol. 18. No. 4 pp 539-542.

The author treated 270 cattle infected with *T. congolense* with 100 cc. of 2.5 per cent solution of Surfen C intramuscularly. Of the 253 animals which were re-examined 1 to 6 months later 28 (11 per cent.) were positive. As the author claims these results based on a single injection are hopeful. [See also this *Bulletin* 1935 Vol 32 p 686 1936 Vol. 33 p 663 1937 Vol 34 pp. 118 119 1938 Vol. 35 p 343.] II Y

VAN SACEGHEM (René) Note sur le traitement des trypanosomiases par le Surfen C chez les bovidés. [Note on the Treatment of Cattle Infected with Trypanosomes by Surfen C.]—*Ann. Soc. Belge de Méd. Trop.* 1939. Dec. 31 Vol. 18. No. 4 pp 699-703

The author draws certain conclusions from his observations. The dose given should not be less than 1 gm. per 100 kilo of weight and it should be given intramuscularly. Trypanosomes do not disappear from the blood for at least 24 hours after treatment. Five days later the blood should be re-examined, and if trypanosomes are present a second dose should be given. Cured animals can be re-infected. The drug acts better on *T. congolense* infections than on *T. vivax* infections.

In the author's opinion Surfen C is a drug of great value. It is preferable to tartar emetic and has the great advantage that it can be given intramuscularly. Unfortunately however its price is prohibitive. IF Y

SOLDINI (M) Procédé pratique et rapide de diagnostic expérimental de la dourine. [A Rapid and Practical Method of diagnosing Dourine.]—*Bull. Soc. Path. Exot.* 1939 Mar 8. Vol. 32. No 3 pp 334-341

After stressing the importance of dourine as a disease of Algerian horses Soldini discusses the various methods which are used for diagnosis in view of the difficulty in finding trypanosomes, i.e. the intrapalpebral reaction of Lanfranchi and Soma, the formal-gel reaction and the complement fixation test.

The method recommended by the author is the incision of the scrotal fluid from the genital lesions of the horse and, failing this, its blood into the testicles of a rabbit. The rabbit's testicles form an eminently suitable medium for the multiplication of *T. equiperdum* and lesions develop between the 4th and 8th days. IF Y

ZWIMER (Raymond L.) & CULBERTSON (James T) The Serum Potassium Level in Trypanosoma equiperdum Infection in Rats the Role of Potassium in Death from this Infection.—*Amer. J. Hyg.* 1939 Jan. Vol. 29 No. 1 Sect. C pp 7-12 With 1 fig [18 refs.]

The authors discuss the various theories which have been advanced to explain the deaths of rats infected with pathogenic trypanosomes and conclude that none of the three theories viz., the production of an endotoxin, the development of hypoglycaemia, or asphyxiation, affords an adequate explanation of the phenomenon. It seemed to the authors that there was a superficial similarity between the terminal spasms of rats infected with pathogenic trypanosomes and the spasms in fatal potassium poisoning and it was considered that possibly death in trypanosomal infections might result from an elevation of the serum potassium above the critical threshold. It was therefore decided to follow the potassium level of the serum of rats throughout the course of infection with *T. equiperdum* with a view to determining whether potassium could play a significant rôle as the cause of death in this infection. Experiments showed that, as a matter of fact the serum potassium level of rats dying of *T. equiperdum* is markedly increased, and that

this increase commenced about 24 hours before death. Accordingly, it is suggested that this elevated serum potassium is a significant factor in the cause of death. II Y

POINDEXTER (Hildrus A.) Relationship of Mononuclear Response to Resistance in Experimental Trypanosomiasis.—*Amer Jl Hyg* 1939 May Vol 29 No 3 Sect C pp 111-114

Young rats have more flexible mononuclear response to stimulation than older rats and this response is associated with a greater response to *T. equiperdum* and its products. A temperature above 41°C. kills or renders *T. equiperdum* avirulent *in vitro* or *in vivo* within 20 to 30 minutes. II Y

KOLMER (John A.) & RULE (Anna M.) Sulphanilamide in the Treatment of Experimental Trypanosomiasis of Rats.—*Proc Soc Experim Biol & Med* 1939 Jan Vol 40 No. 1 pp 77-79

The general conclusion reached in this work is that sulphanilamide either by intravenous or oral administration is ineffective in the treatment of *T. equiperdum* infections of rats. II Y

JAUFFRET (R.) Contribution à l'étude du surra des bovidés au Cambodge [Surra in Cambodia Cattle].—*Rec Méd 1^{re} Exot* 1939 Jan.-Mar Vol 12 No 1 pp 5-14

Blood examination of 4 668 cattle more than 8 years old revealed the fact that 5 per cent were infected with *T. evansi*. The infection was only discovered after antiplague vaccination and the appearance of trypanosomes always followed the febrile disturbance provoked by the vaccine. These observations show that cattle constitute the reservoir of *T. evansi*. Treatment by naganol gave good results [See also this *Bulletin* 1938 Vol. 35 p 330] II Y

PAYLOV (P.) & GUENEV (Chr.) Recherches sur un trypanosome (*Trypanosoma evansi* Steel 1885) trouvé dans le sang d'un cheval de la région de Bourgas en Bulgarie (Note préliminaire).—[A Trypanosome (*T. evansi*) found in a Horse in Bulgaria].—*Ann Parasit Humaine et Comparée* 1939 Mar 1 Vol. 17 No 2, pp 158-161 With 2 figs [16 refs]

The authors describe and figure a trypanosome found by them in a horse at Bourgas, Bulgaria which they identify as *T. evansi*. II Y

LLOVEROL (H.) Le sérum normal de cynocéphale (*Papio papio* Desm.) dans le traitement de la trypanosomiase expérimentale du mouton à *T. dimorphon* Laveran et Mesnil. [Cynoccephalus Serum in the Treatment of Experimental *T. dimorphon* Infections of Sheep].—*Bull Soc Path Exot* 1939 Mar 8 Vol. 32 No 3 pp 328-334

The author used 8 sheep in his experiments. All were inoculated subcutaneously with *T. dimorphon* Laveran and Mesnil isolated from a naturally infected sheep. Three of the animals were kept as controls.

and 5 were treated with the serum of a normal *Cynocephalus*. Protocols of the observations are set out at length.

The author concludes from his work that a single dose of 15 to 20 cc. of the serum given intravenously is able to produce sterilization of a sheep experimentally infected with *T. dimorphus*. He considers that he cured 2 of his 5 sheep. The serum, however, may produce serious and even fatal results in debilitated animals.

IV Y

DUCA (Charles J.) Studies on Age Resistance against Trypanosome Infections II. The Resistance of Rats of Different Age Groups to *Trypanosoma lewisi* and the Blood Response of Rats Infected with this Parasite.—*Amer J Hyg* 1939 Jan. Vol 29 No. 1 Sect. C. pp 25-32 With 1 fig [12 refs]

The earliest investigators had observed that young rats suffered more intense and more frequently fatal infections from *T. lewisi* than did older animals. Casual observations by Duca on some hundreds of rats in the Department of Bacteriology at Columbia University revealed a higher mortality from *T. lewisi* to occur in suckling rats and it was decided to investigate the problem methodically.

After it had been established that rats of different ages differ in their resistance to *T. lewisi* an attempt was made to investigate the actual mechanism responsible for the age difference. The leucocyte response and the erythrocyte picture were studied in considerable detail. The following are the conclusions—

- "(1) There is a sharp difference in the resistance against *Trypanosoma lewisi* among rats of different ages. *T. lewisi* is markedly pathogenic for rats 25 days of age or younger and in them frequently causes death. Death because of *T. lewisi* infection occurs only rarely in rats more than 25 days old.
- "(2) Rats which survive a *T. lewisi* infection exhibit about the time of the crisis, a marked leucocytosis and a marked absolute monocytosis. This white cell response does not occur in rats which die from *T. lewisi* infection.
- "(3) Rats infected with *T. lewisi* exhibit a marked secondary anaemia. This is probably a major factor in the death of rats less than 25 days of age.

IV Y

CULBERTSON (James T.) & KESSLER (Walter R.) Studies on Age Resistance against Trypanosome Infections III. Vaccination of Rats against *Trypanosoma lewisi* with Special Reference to the Response of Different Age Groups.—*Amer J Hyg* 1939 Jan. Vol 29 No 1 Sect. C pp. 33-43 [15 refs]

It was found that rats can be rendered completely resistant to *T. lewisi* by the repeated injection of formalized homologous antigen. Among mature rats a few injections given at intervals of several days sufficed to produce complete resistance to injections of large numbers of living parasites. Older rats respond considerably better than younger rats. They respond promptly with the production of agglutinin, and the titre of the agglutinin developed is roughly related to the degree of resistance shown against the living organisms. Sucklings manifest only feeble capacity to produce agglutinins, and some of the younger animals succumb to vaccination quite as readily as non-vaccinated rats of the same age.

IV Y

CULBERTSON (James T) Studies on Age Resistance against Trypanosome Infections. IV The Activity of Germanin (Bayer 205) upon *Trypanosoma equiperdum* Infections in Rats of Different Age Groups.—*Amer Jl Hyg* 1939 Mar Vol. 29 No 2. Sect. C. pp 73-77 [12 refs.]

It is believed that many of the well-known chemotherapeutic substances require for their action upon an invading parasite the intervention of the cells of the host body. As in previous work [see above] the author has found that the reticulo-endothelial system of young rats is less effective in affording the body definite resistance against infections with certain species of trypanosome than is that of older rats. It appeared worth while performing an experiment to determine the comparative efficacy of germanin in the treatment of experimental *T. equiperdum* infections in rats of different age groups.

It was found that in nursing rats the organisms generally persist for 30 to 36 hours after injection of the drug whereas in older rats with an equal infection the parasites disappear within 15 hours. It is concluded that the difference is probably related to a difference in the phagocytic capacities of the cells of the rats of different age groups.

IV Y

CULBERTSON (James T) Transmission of Resistance against *Trypanosoma lewisi* from a Passively Immunized Mother Rat to Young nursing upon her [Research Notes].—*Jl Parasitology* 1939 Apr Vol. 25 No. 2. pp 182-183

The experiments described in this note show that a normal mother rat, passively immunized after delivery against *T. lewisi* by intraperitoneal injection of the serum of a specifically immunized rat will afford resistance to young rats nursing upon her. It thus appears that the resistance naturally acquired by young rats from an immune mother is dependent upon the transfer to the young of an antibody identical with or similar to that found in the blood of the parent.

IV Y

CULBERTSON (James T) The Immunization of Rats of Different Age Groups against *Trypanosoma lewisi* by the Administration of Specific Antiserum *per os*. [Research Notes].—*Jl Parasitology* 1939 Apr Vol. 25 No 2 pp 181-182.

In previous work the author showed [see above] that the young of a rat immune to *T. lewisi* are also resistant to this parasite the resistance being acquired by the young largely after birth through the ingestion of the milk of the immune mother. The remarkable facility with which the young of all nursing ages acquired immunity led to an experiment to determine whether rats of different age groups could be protected against *T. lewisi* by the administration of a specific antiserum *per os*.

Rats of various ages, from 10 to 60 days were given *per os* 0.5 cc of specific antiserum per 10 gm. of body weight. The experiments showed that rats can be immunized against *T. lewisi* in this way throughout the usual nursing period (21 days) although late in this period with progressively less effectivity. Whether the intestine of older animals becomes impermeable to the antibody or develops the capacity to denaturize this antibody is as yet unknown.

IV Y

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W Y

CULBERTSON (James T) Phagocytosis of Trypan Blue in Rats of Different Age Groups.—*Arch. Pathology* 1939 Feb Vol. 27 No 2, pp. 212-217 With 1 fig

The work described in this paper was devised with the object of ascertaining whether the increased natural resistance against certain infections manifested by man and animals as they grow older may be related to an increasing reactivity of protective cells. It was hoped to find through the use of trypan blue whether the phagocytic function of these cells becomes more effective as the animals approach maturity.

In his experiments the author used a 1 per cent. suspension of trypan blue in distilled water on groups of rats 6 10 15 18, 23 40 and 60 days old, respectively. All the animals were kept on a standard diet. Half of them received an intraperitoneal injection of 0.1 cc. of the suspension of trypan blue per 10 gm. of body weight and the remainder twice this dose. Eighteen hours later all the rats were killed and the various tissues fixed and stained lightly with eosin.

Examination of the tissues revealed no significant difference in the phagocytic capacity of the cells of any of the organs of the various age groups, except the liver. In this organ, however, well marked and constant differences were observed. Not only did more Kupffer cells in the liver of the older rats contain particles of the dye, but larger numbers of particles were found within each phagocytosing Kupffer cell of the older animals. These points are brought out in a table and in photographs. The conclusions are as follows:—

There is a difference in capacity for phagocytic function between young and old rats, the Kupffer cells of nursing animals being less able to phagocytose particles of trypan blue than the Kupffer cells of older animals. This difference can be correlated with a gradually acquired resistance of rats against a natural blood flagellate (*Trypanosoma lewisi*) of this animal. It is suggested that the resistance which the rat naturally acquires against this parasite as it grows older is in part accounted for by a gradually acquired enhancement in the phagocytic capacity of the host's cells.

W 1

MAZZA (Salvador) et al. Investigaciones sobre la enfermedad de Chagas. Gobernación Chaco. A. La enfermedad de Chagas en la gobernación del Chaco [Chagas Disease Its Presence in the Chaco].—*Universidad Buenos Aires. Misión de Estudios de Patología Regional Argentina* Juwy 1939. Publicación No 40 pp. 1-150. With 104 illustrations.

Dr. Mazza in an introductory article mentions 68 human acute cases of Chagas disease seen in various parts of the Chaco and the finding of 184 *Triatoma infestans* positive among 506 collected from the houses. Of the 68 human patients, 7 were under 6 months of age, 11 between 1 and 2 years, 13 between 2 and 3 years, 12 between 5 and 10 years and after that a progressive diminution with age. 44 were under 10 years.

In a series of eight papers Dr. Mazza and his colleagues record cases seen in different parts of the Chaco country, all of them typical.

H H S

BRUMPT (E) Faits expérimentaux et cliniques concernant le mode de transmission de la maladie de Chagas ou trypanosomose américaine [Experimental and Clinical Facts concerning the Method of Transmission of Chagas Disease]—*C R Soc Biol* 1939 Vol 130 No 12 pp 1197-1200

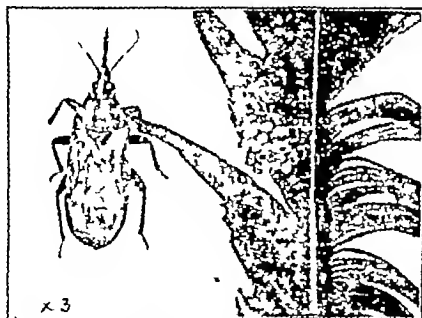
It is now generally agreed that the usual mode of infection of the vertebrate with *T. cruzi* is by the infected excreta of the reduviid bugs. Various experiments have however from time to time been recorded suggesting that the bite of the bugs may sometimes be infective. Brumpt considers the criticisms which have been raised to such conclusions and records more recent observations of his own.

During his recent visit to Mexico (1933) he isolated a number of strains of *T. cruzi*. One of these was virulent to mice attempts to infect a young rat by the bite of 50 young nymphs the dejecta of which were infective for rats of the same age failed. Similar negative results were obtained in Brumpt's laboratory by DENECKE and VON HALLER.

W Y

PIFANO (Félix) Anotaciones acerca del *Psammolestes Arthuri* Pinto 1926 (Hemiptera heteroptera triatomidae) reduviedo hematófago encontrado en nidos de cucarachero de monte (probablemente *Dendrocopaltidae*) en un sector de los Valles del Yaracuy. Su importancia como posible vector en la naturaleza del *Schizotritpanum Cruzi* Chagas 1909 (*Psammolestes arthuri* a Possible Natural Vector of *Trypanosoma cruzi*)—*Gac Med de Caracas* 1933 Aug 31 Vol 45 No 16 pp 241-245 With 5 figs.

The author gives a very detailed description of a reduviid bug captured in the Yaracuy Valley, Venezuela and identified as *Psammolestes arthuri* Pinto 1926. Up to the present it has not been found



Psammolestes arthuri Pinto, 1926.

Photograph of the insect together with a leather from its nest showing a deposit of its eggs

[Reproduced from the *Gaceta Médica de Caracas*]

ROMANA (C.) Reproduction chez le singe de la conjonctivite schizotrypanosomienne unilatérale. [Reproduction in the Monkey of Unilateral Trypanosomal Conjunctivitis].—*Bull Soc Path Exot.* 1939 Apr 4 Vol. 32, No. 4 pp 390-394 With 2 figs.

The author has reproduced in two monkeys the unilateral conjunctivitis, seen so commonly as an early sign of Chagas disease by depositing in the conjunctiva the infected faeces of *Rhodnius prolixus*. Signs appeared 10 days later and the clinical syndrome was similar to that observed in human patients. IF 1

RELAPSING FEVER AND OTHER SPIROCHAETOSSES

Prices of Abstracts in this Section

DELFT and RAFTI (p. 757) report on the presence of relapsing fever in Iran and state that the incidence is greater than has been generally believed. Clinically the course is often long and the infection resistant to treatment. The spirochaete, *S. persica* was studied and transmission experiments made with various species of tick. A suggested classification of the strains of relapsing fever spirochaetes is given based on their behaviour in guinea-pigs. WHEELER (p. 753) records a total of 138 cases in California in the 17 years since the disease was discovered there—nearly all the infections occurred in June–September and nearly half the total in July. He gives an account of transmission experiments—it was rare (less than 2 per cent) for the infection to pass through the egg to the larval stage of the tick, *O. hermsi*. Ticks might become infected directly by sucking the blood of other ticks. BOXÉ (p. 759) by experiments with *O. montana* on mice showed that the insect's salivary glands do not become infected. Injection of the faeces also failed to convey the disease—the infecting agent is considered to be the coxal fluid. The same author offers further experimental evidence that *S. danovus* can penetrate the barrier between the haemocoel and the coxal glands and appear in the coxal fluid whereas foreign corpuscles, bacteria, etc. do not. He tested the hereditary transmission of the same spirochaete by *O. montana*—the results varied but on the whole tended to support the view that infection is transmitted to the next generation by spirochaetes *as such*. Duration of infectivity of *O. furcata* was investigated by FRANCIS (p. 760). He found that Texan relapsing fever was transmitted by their bite after starvation for 5 years, and by others which had been fed once only in 6½ years. The coxal fluid was not infective. Hereditary transmission via eggs of infected ticks was observed. The Texan strain in man did not respond to neocarsphenamine. Bed bugs after feeding on infected patients, themselves infected mice which ingested these insects.

KIRK (p. 761) made a laboratory study by cultivation and animal inoculation, of a louse transmitted spirochaete from Abyssinia. Attempts to infect ticks especially *O. sergryi* with this strain were completely unsuccessful although this tick is an important vector in Abyssinia. CHUNG and WEI (p. 763) investigated the mechanism of transmission of relapsing fever by the louse to a general paralytic

subjected to pyretotherapy. The authors findings support the view that the bodies of the insects are infective whereas their bite is not. MORISSETTA (p 763) found that the rat-mite *Liponyssus* would retain infection with spirochaetes for 7 days but that it does not transmit it by the bite nor is the infection passed to the next generation.

CHUNG and CHANG (p 763) studied clinically 337 patients in the Peiping Hospital between 1921-37. Males greatly preponderated 6 to 1 in corrected figures. The disease occurs in the district all the year round but the incidence rises from December to reach a climax in April. A detailed analysis of the symptoms is given. DIGONNET and MATHIS (p 765) describe the case of a woman two months pregnant infected by relapsing fever (tick borne) in spite of threatened abortion pregnancy went to term. A method for facilitating diagnosis is described by SNOOKS (p 765) by which in the case of blood the cells are dissolved out by a haemolytic system and in the case of tissues by a cytolytic agent. He recommends 10 per cent sodium taurocholate with methylene blue whereby the spirochaetes are stained and so though few in number are easily seen.

LOBENWICKA (p 766) notes the increase of cells lymphocytes mainly, together with increase of pressure in the cerebrospinal fluid of African relapsing fever patients. Meningeal symptoms are far from uncommon in African relapsing fever—a fact to be borne in mind in regions where trypanosomiasis exists.

DI BENEDETTO (p 766) gives a clinical review of 193 cases of relapsing fever observed in Italian East Africa but does not mention whether the vector in this district is a louse or a tick. In speaking of treatment arsenicals seem to be essential for success though he regards their combination with auxillaries such as insulin, and liver extract as more beneficial than the first alone. Figures to support his thesis are not however given.

HAWKING (p 767) has tested the reaction of strains of relapsing fever spirochaetes to chemicals—arsenic, antimony, gold and acriflavine preparations—using methods previously employed with trypanosomes. Details are given in a table. The work of André SERGENT (p 768) on relapsing fever in Algeria has already been referred to [this *Bulletin* 1939 Vol. 36 p 108] the article noted here is an *In Memoriam* issue.

H H S

DELPA (L.) & RAYSI (A) Sur la fièvre récurrente sporadique en Iran. Contribution à l'étude expérimentale de *Spirochaeta persica* Dschunkowsky, 1913 [Sporadic Relapsing Fever in Iran. A Contribution to the Experimental Study of *Spirochaeta persica* Dschunkowsky, 1918.]—*Ann. Parasit. Humaine et Comparée* 1939 Jan 1 Vol. 17 No 1 pp 45-61 With 1 chart & 3 figs.

The authors mention the frequent occurrence of cases of persistent and irregular fever resistant to quinine occurring in the region to the East of Teheran. During the summer of 1937 whilst examining only people more or less attached to the laboratory 5 of such cases were found to be typical infections of relapsing fever which suggests that the disease is much more common in Iran than was previously supposed.

All these 5 cases occurred in the village of Hessarek and all the patients had been exposed to the bites of *Ornithodoros tholozani* (*O. papillipes*). The course of the disease is long and often serious.

One of the patients had four febrile attacks in 17 days and a fifth 13 days later. After being under observation for 45 days, the blood of this patient was still infective to rabbits. Two of the cases responded to treatment with novarsenobenzol, but in two others the course of the disease seemed to be unaffected.

An experimental study was made of the spirochaete *S. persica* isolated from these cases. The results of inoculation experiments show that rats and rabbits are quite as susceptible to infection as guinea-pigs. Splenectomized dogs are rather less susceptible, also sheep and in the latter species spirochaetes were never seen in the blood. The brain remained infective up to 268 days in the case of the rat, 24 to 25 days in dogs and 8 to 73 days in sheep. In the rat the incubation period may be as long as 20 days, double that in the guinea-pig, but otherwise the infection follows the same course as in guinea-pigs and rabbits.

Three rabbits and a guinea-pig that had recovered from infection 2 to 7½ months previously were found to be immune against reinfection.

Transmission experiments were made with *Ornithodoros tholozani*, *O. lahorensis* and *Hyalomma dromedarii* which were allowed to feed on infected animals and subsequently the following stage fed on normal animals. *O. lahorensis* and *H. dromedarii* gave negative results but in the case of *O. tholozani* a nymph infected after the first moult produced infection by its bite 116 days later and in the adult stage a second infection after 458 days. A female tick infected a rabbit by its bite 371 days after feeding on an infected rat and after 328 days it had laid eggs from which hatched infected larvae.

The authors conclude with a general discussion on the various strains of relapsing fever spirochaetes occurring in Central Asia, and classify them as follows according to their behaviour in guinea-pigs.

A. Strains highly pathogenic to guinea-pigs, often fatal, with splenomegaly even to rupture of the spleen.

(a) *S. uzbekistanica* Pilgoul 1928 (Mortality 100 per cent.)

(b) Strain Stalinbad. Pavlovsky and Brumpt 1934 (Mortality 71 per cent with haemoperitoneum)

(c) Strains S5 and S11 Adler *et al* 1937. Mortality 37 & 48 per cent splenomegaly and frequent rupture of the spleen.

B. Strains producing a more or less intense blood infection but without any appreciable lesions and ending in recovery.

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A total of 138 cases of infection have been recorded which nearly all occurred between June and September July being the month with most cases (62)

The infection has been transmitted to white mice monkeys and human subjects by the bites of infected ticks and it has been shown that the infection passes through the egg to the larva in less than 2 per cent. of about 600 tested. Seven rhesus monkeys were exposed to the bites of 17 infected ticks but only one monkey developed the infection spirochaetes appearing after an incubation period of 16 days. During these experiments no faeces or coxal fluid were excreted by the ticks whilst feeding and therefore the infection must have been introduced by means of the mouth parts presumably from the salivary glands. It was also noted that in nature ticks sometimes suck blood from other ticks and in this way infection might be transmitted from one tick to another without the presence of a mammalian host.

Seven human subjects were exposed to the bites of infected ticks and one of them bitten by 2 adults developed the disease after an incubation period of 7 days and showed three febrile attacks spirochaetes being found in the first two of them. Although this patient had received a systematic treatment with neosalvarsan bismuth and trypanamide for nearly 17 months this did not seem to alter the course of the infection with relapsing fever. E H

BONÉ (G) Mode de transmission du spirochète de Dutton par les *Ornithodoros moubala* [The Method of Transmission of *Spirochaeta duttoni* by *Ornithodoros moubala*].—C R Soc Biol 1938. Vol 129 No 32 pp 901-903

The author has fed on various mice 337 nymphs infected both hereditarily and by feeding on infected blood and also 10 adults of *Ornithodoros moubala* without ever producing infection with *Spirochaeta duttoni*. It is concluded therefore that the salivary glands do not become infected. Negative results were also obtained by the injection of the tick's faeces, and the author considers that the coxal fluid alone is responsible for the production of infection. E H

BONÉ (G) L'infection des *Ornithodoros moubala* par le spirochète de Dutton [The Infection of *Ornithodoros moubala* with *Spirochaeta duttoni*].—C R Soc Biol 1938 Vol 129 No 32 pp 903-905

The author has made dark ground examinations of the contents of *O. moubala* fed on mice infected with *S. duttoni*. The spirochaetes were found to enter the coelomic fluid and there multiply by simple fission. It was also noted that when ticks became fully engorged the spirochaetes entered the coelomic fluid much more readily than in ticks only partially engorged. Also an increase in the number of spirochaetes in this fluid was noted when infected ticks were fed on normal mice which is supposed to be due to the liberation of spirochaetes from the wall of the gut as a result of the passage of fluid from the newly ingested blood.

Ticks were infected artificially by the injection of spirochaetes into their coelomic cavity and showed the multiplication of these organisms and the coxal fluid became infective. Also the same augmentation in numbers was observed when they were fed on normal mice.

One of the patients had four febrile attacks in 17 days and a fifth 13 days later. After being under observation for 45 days the blood of this patient was still infective to rabbits. Two of the cases responded to treatment with novarsenobenzol, but in two others the course of the disease seemed to be unaffected.

An experimental study was made of the spirochaete, *S. persica* isolated from these cases. The results of inoculation experiments show that rats and rabbits are quite as susceptible to infection as guinea-pigs. Splenectomized dogs are rather less susceptible also sheep and in the latter species spirochaetes were never seen in the blood. The brain remained infective up to 268 days in the case of the rat 24 to 25 days in dogs and 8 to 73 days in sheep. In the rat the incubation period may be as long as 20 days double that in the guinea-pig, but otherwise the infection follows the same course as in guinea-pigs and rabbits.

Three rabbits and a guinea-pig that had recovered from infection 2 to 7½ months previously were found to be immune against reinfection.

Transmission experiments were made with *Ornithodoros tholozani*, *O. lahorensis* and *Lipalomma dromedarii* which were allowed to feed on infected animals and subsequently the following stage fed on normal animals. *O. lahorensis* and *L. dromedarii* gave negative results, but in the case of *O. tholozani* a nymph infected after the first moult produced infection by its bite 116 days later and in the adult stage a second infection after 458 days. A female tick infected a rabbit by its bite 371 days after feeding on an infected rat and after 323 days it had laid eggs from which hatched infected larvae.

The authors conclude with a general discussion on the various strains of relapsing fever spirochaetes occurring in Central Asia, and classify them as follows according to their behaviour in guinea-pigs.

- A. Strains highly pathogenic to guinea-pigs often fatal, with splenomegaly even to rupture of the spleen.
 - (a) *S. usbekistanica* Pikoul 1928 (Mortality 100 per cent.)
 - (b) Strain Stalmbad. Pavlovsky and Brumpt 1934 (Mortality 71 per cent with haemoperitoneum.)
 - (c) Strains S5 and S11 Adler *et al* 1937 Mortality 37 & 46 per cent splenomegaly and frequent rupture of the spleen.
- B. Strains producing a more or less intense blood infection, but without any appreciable symptoms or lesions and ending in recovery.
 - (a) Schachnysjaba Strain, Moscow, 1927-28.
 - (b) *S. sogdianum* Nicolle and Anderson 1928.
 - (c) *S. persica* Dachunkowsky 1913 which probably includes the two other strains a and b assigned to this group
E. Hindle.

WHEELER (Charles M.) Relapsing Fever in California. Attempts to transmit Spirochaetes of California Relapsing Fever to Human Subjects by Means of the Bite of the Vector *Ornithodoros hermsi* Wheeler.—*Amer J Trop Med* 1938 Nov Vol. 18, No. 6. pp. 641-656 With 1 map 3 figs & 1 plate. [12 refs.]

A summary of the case distribution of relapsing fever in California since its discovery in 1921 up to 1937 together with an account of transmission experiments with its vector *Ornithodoros hermsi*

A total of 138 cases of infection have been recorded which nearly all occurred between June and September July being the month with most cases (62)

The infection has been transmitted to white mice monkeys and human subjects by the bites of infected ticks and it has been shown that the infection passes through the egg to the larva in less than 2 per cent of about 600 tested. Seven rhesus monkeys were exposed to the bites of 17 infected ticks but only one monkey developed the infection spirochaetes appearing after an incubation period of 16 days. During these experiments no faeces or coxal fluid were excreted by the ticks whilst feeding and therefore the infection must have been introduced by means of the mouth parts presumably from the salivary glands. It was also noted that in nature ticks sometimes suck blood from other ticks and in this way infection might be transmitted from one tick to another without the presence of a mammalian host

Seven human subjects were exposed to the bites of infected ticks and one of them bitten by 2 adults developed the disease after an incubation period of 7 days and showed three febrile attacks spirochaetes being found in the first two of them. Although this patient had received a systematic treatment with neosalvarsan bismuth and trypanamide for nearly 17 months this did not seem to alter the course of the infection with relapsing fever E H

BOVÉ (G) Mode de transmission du spirochète de Dutton par les *Ornithodores moubata* [The Method of Transmission of *Spirochaeta duttoni* by *Ornithodorus moubata*]—*C R Soc Biol* 1938 Vol 129 No 32 pp 901-903

The author has fed on various mice 337 nymphs infected both hereditarily and by feeding on infected blood and also 10 adults of *Ornithodorus moubata* without ever producing infection with *Spirochaeta duttoni*. It is concluded therefore that the salivary glands do not become infected. Negative results were also obtained by the injection of the tick's faeces and the author considers that the coxal fluid alone is responsible for the production of infection E H

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The author has made dark ground examinations of the contents of *O moubata* fed on mice infected with *S duttoni*. The spirochaetes were found to enter the coelomic fluid and there multiply by simple fission. It was also noted that when ticks became fully engorged the spirochaetes entered the coelomic fluid much more readily than in ticks only partially engorged. Also an increase in the number of spirochaetes in this fluid was noted when infected ticks were fed on normal mice which is supposed to be due to the liberation of spirochaetes from the wall of the gut as a result of the passage of fluid from the newly ingested blood.

Ticks were infected artificially by the injection of spirochaetes into their coelomic cavity and showed the multiplication of these organisms, and the coxal fluid became infective. Also the same augmentation in numbers was observed when they were fed on normal mice.

The author is of the opinion that his observations are in favour of a simple multiplication of the spirochaete in the body of the tick, without any other cycle of development

BOAS (Georges) L'excrétion des spirochètes de Dutton chez *Ornithodoros moubata* [The Excretion of *Spirochaeta duttoni* in *Ornithodoros moubata*]—C R Soc Biol 1909 Vol. 130 No. 1 pp 84-83 E H

A continuation of a previous note on the subject [See above.] The author has now investigated the problem of the presence of spirochaetes in the coxal fluid of infected *Ornithodoros*. Suspensions of sheep red cells, of bacteria, or of spirochaetes were injected into the haemocoel of different ticks and in some instances coxal fluid was emitted whilst the tick was being injected. In other cases the ticks were afterwards fed on mice and the coxal fluid collected. In both groups, spirochaetes were the only elements to appear in the coxal fluid, showing that there is a barrier between the haemocoel and the coxal glands. Consequently the spirochaetes must penetrate through this barrier in order to get into the cavity of the coxal glands.

BOAS (G) La transmission héréditaire du spirochète de Dutton à *Ornithodoros moubata* [The Hereditary Transmission of *Spirochaeta duttoni* in *Ornithodoros moubata*]—C R. Soc Biol 1930 Vol. 130 No 1 pp 86-87 E H

The author has examined the contents of eggs laid by *Ornithodoros moubata* fed on mice infected with *Spirochaeta duttoni*. In one case 40 eggs were examined without finding a single spirochaete but in a second experiment 3 females laid eggs which all contained spirochaetes. In a third experiment these same females laid eggs in which spirochaetes could not be found. In view of the fact that some of the eggs contain spirochaetes the author assumes that in ticks the infection is transmitted to the next generation by spirochaetes as such and not by any other stage.

Only 2 out of 7 mice injected with 5 to 100 of these eggs became infected, which the author considers may have been the result of the virulence of the spirochaetes being attenuated, or of their being affected by the coating of egg substance.

FRANCIS (Edward) Longevity of the Tick *Ornithodoros turicata* and of *Spirochaeta recurrentis* within this Tick.—Public Health Rep 1929 Dec 23 Vol. 53 No 51 pp 2220-2241 With 3 charts & 9 figs (8 on 3 plates) [20 refs] E H

A valuable summary of laboratory observations extending over 7 years upon 119 naturally infected *Ornithodoros turicata* collected in caves in Texas in 1931 and upon the survival of relapsing fever spirochaetes within these ticks for 6½ years. The ticks were collected from caves and overhanging ledges in various parts of Texas and naturally occurred in powdery dust or sand. All were fed on arrival in 1931 on two normal rhesus monkeys both of which became infected with relapsing fever. These ticks were kept in a corner of the laboratory in Washington from which steam heat

was excluded. Of the original 119 ticks 64 survived starvation for 3 years, 35 for 4 years and 13 for 5 years. They were tested as follows

12 ticks starved 3 years infected a monkey, and became group A	
11	4 B
13	5 C
5 group A ticks fed once in 6 years failed to infect	
5 " B	6½ years infected a monkey

Hereditary transmission of the infection to the next generation of ticks was obtained through eggs from naturally infected ticks and also from those artificially infected

Bed bugs *Cimex lectularius* if fed on blood containing spirochaetes were found to produce infection in 4 out of 8 mice which ingested these bugs. White mice readily attack and eat bed bugs therefore this is a way in which the infection might be transmitted. Eight lots of bugs also ingested blood containing *Spirillum minus* and were subsequently eaten by mice but none of them showed any signs of infection. Negative results were also obtained in attempts to infect mice by feeding them with lice *Pediculus longiceps* collected from infected monkeys. Although spirochaetes were not found in monkey lice during their first 16 days of subsistence on an infected monkey, they were demonstrated daily after the 17th day but these infected lice failed to infect a monkey on which 1,550 of them were liberated.

Various observations were made on the biology and life history of *O. turicata*. Spirochaetes were never found in the coxal fluid of infected ticks when examined by dark field and white mice inoculated with the fluid remained negative. The ticks are very resistant to moisture and continuous immersion in distilled water for a week had no ill effects.

Rhesus monkeys were found to be very susceptible to this relapsing fever and the incubation period averaged 4½ days for the first appearance of spirochaetes in the blood and 5½ days to the first onset of fever. Two monkeys out of eight succumbed to the disease and those which recovered did not show immunity to second attacks, 9 months to a year after the original infection.

The author includes useful observations on the methods of feeding ticks on animals.

Finally it is noted that neosarsphenamine failed to show any specific therapeutic value in three human cases infected with this Texas strain of relapsing fever

E H

KIRK (R.) A Laboratory Study of Abyssinian Louse-borne Relapsing Fever—*Ann Trop Med & Parasit* 1938. Dec. 21 Vol. 32. No 4 pp 339-356 With 1 text fig & 4 figs on 1 plate [39 refs.]

An interesting laboratory study of a strain of relapsing fever of Abyssinian origin, isolated from cases occurring in the Sudan in which the louse was incriminated as the vector

The length of the spirochaetes was found to average 18µ. Attempts to culture them on Yuan Po's and many other media gave completely negative results, but excellent cultures were obtained in a modified Noguchi medium prepared as follows—Under sterile conditions half-an-inch of egg albumen was pipetted into 5"×½" test tubes and then coagulated at 80°C. Then the tubes were filled to within 1½" from the top with fresh ascitic fluid. The tubes were inoculated with

The author is of the opinion that his observations are in favour of a simple multiplication of the spirochaete in the body of the tick without any other cycle of development.

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3-5 drops of blood containing spirochaetes and incubated at 37°C. The organisms grew very rapidly and subcultures were made every 2-4 days. One strain was passed through 12 subcultures without any diminution in virulence.

White rats rabbits, guineapigs and the ordinary black and brown wild rats were all insusceptible but white mice were readily infected from human cases spirochaetes appearing 12-24 hours after inoculation always present after 48 hours, and generally disappearing on the third day. Gerbilles were also susceptible.

Subinoculations from mouse to mouse were unsuccessful and passage through monkeys did not enhance the virulence.

The common grey monkey of the Sudan (*Cercopithecus sabarus*) was susceptible, and usually showed one relapse resembling the course in human beings. The strain was maintained in these animals for three passages. Spirochaetes were found in the haemocoel fluid of lice from infected persons, and a monkey was infected by rubbing some of the contents of a single louse on to the shaved abdomen of a splenectomized animal. This monkey died 12 days later with its blood swarming with spirochaetes and was the only one to die in the first paroxysm of relapsing fever. It is suggested that the disease acquired from the louse is more virulent than that produced by blood inoculation.

Evidence of immunity was found in infected animals but several antigenic variants were present. In monkeys splenectomy was found to influence the course of the first infection but had no effect on acquired immunity. In mice, splenectomy had no effect, probably owing to the fact that with very mild infections, the reserves of the reticulo-endothelial system are sufficient to mask any effects of splenectomy.

No evidence of latent or residual infections was found in mice and gerbilles after recovery.

The Abyssinian strain of relapsing fever evidently resembles in its general features other members of the North African group of louse-borne strains.

E. H.

KIRA (R) The Non-Transmission of Abyssinian Louse-borne Relapsing Fever by the Tick *Ornithodoros savignyi* and Certain Other Blood-sucking Arthropods.—*Ann Trop Med & Parasit* 1938 Dec 21 Vol 32 No 4 pp 357-365. [34 refs.]

A record of experiments with an Abyssinian strain of louse-borne relapsing fever [see above p. 761] to determine whether it could be transmitted by other blood-sucking Arthropods.

Special attention was paid to the possibility of *Ornithodoros savignyi* as it has been cited as an important vector of relapsing fever in Abyssinia. The ticks were allowed to feed on either infected persons or animals and then after varying periods attempts were made to infect susceptible animals by the bite of these ticks, by the inoculation of coval fluid, and finally by the inoculation of their total contents. The results of these experiments were entirely negative and in addition spirochaetes were never found by dark ground examination of the coval fluid or in stained smears of the contents of the ticks. A single experiment with *Argas persicus* with six weeks interval between the infective meal and the inoculation of the ticks contents into mice, also gave negative results.

The examination of lice *Pediculus* found on infected monkeys showed the presence of abundant spirochaetes in smears of the lice even when no blood cells were noticed but all attempts to produce infection by the inoculation of the contents of these lice into a splenectomized monkey and gerbilles were uniformly negative.

E H

CHUNG (Huei Lan) & WEI (Yu-Lan) Studies on the Transmission of Relapsing Fever in North China. II Observations on the Mechanism of Transmission of Relapsing Fever in Man.—*Amer J Trop Med* 1938 Nov Vol 18 No 6 pp 661-674 With 2 figs [13 refs]

A record of experiments on the transmission of the Chinese strain of *Spirochaeta recurrentis* performed on 6 normal subjects and 4 patients with general paralysis of the insane

Five subjects were exposed to the bites of large numbers of human lice which were known to be infected with the spirochaete but no signs of infection were observed When four lice infected 12 days previously were ground up in saline and this emulsion was placed on the skin of the forearm of a man who had just been bitten in the same place by normal lice this patient became infected with relapsing fever after 11 days incubation period Similar positive results were obtained by the introduction of the contents of body lice into the conjunctiva in two out of three patients exposed to infection the incubation period being 8 days.

Various attempts to infect patients by placing the contents of infected lice in the mouth gave uniformly negative results In one experiment the faeces of 100 lice collected daily 7 to 12 days after an infective feed were instilled on to the excoriated skin of a volunteer but no fever was observed during six weeks.

The results of these experiments support the view that the bites of infected lice are innocuous, and that the disease is contracted through crushing infected lice on the skin or introducing the infective material on to the conjunctivae.

E H

MORISITA (T) Transmission Experiments on Relapsing Fever with Tropical Rat-Mite, *Liponyssus* sp.—*Japanese J Experm Med* 1938 Dec. 20 Vol. 16 No 6 pp 551-558

The author found that mites (*Liponyssus* sp.) collected from mice infected with spirochaetal relapsing fever (strain not stated) retained the infection up to seven days. Transmission was never obtained by the bites of these mites but only by the inoculation of the ground up contents. Moreover the eggs and larvae from these mites never contained spirochaetes.

E H

CHUNG (Hui Lan) & CHANG (F C.) Relapsing Fever Clinical and Statistical Study of 337 Cases.—*Chinese Med J* 1939 Jan Vol. 55 No 1 pp 6-33 With 3 charts [16 refs.]

A useful clinical and statistical study of 337 in patients suffering from relapsing fever observed in the Peiping Union Medical College Hospital from 1921 to 1937 In every instance the diagnosis was confirmed by finding *Spirochaeta recurrentis* in the blood.

The sex distribution was 1 female to 17 males, and even after correction for ratio of admissions, was 1 female to 6 males probably owing to the fact that most of the patients contracted the disease in army camps poor-houses and small inns where the population was exclusively male.

The disease is endemo-epidemic in Peiping and occurs in all months of the year. The incidence is lowest in autumn, begins to rise in December and reaches its climax in April and May after which it declines.

The symptoms of these 337 patients are given in the following table.

Symptoms	No. of cases	Percent	Symptoms	No. of cases	Percent.
Sudden onset	307	91.5	Sweating	92	27.3
Fever	326	96.8	Scanty urination	85	25.2
Headache or dizziness	257	76.2	Abdominal pain	64	19.0
Chills or chilliness	215	72.7	Thirst	60	17.8
Anorexia	233	69.2	Auditory disturbance	47	14.0
General aching	198	58.8	Diarrhoea	47	14.0
Constipation	159	47.4	Visual disturbance	35	10.4
Cough	139	41.2	Epigastric pain	32	9.5
Prostration	124	36.8	Chest pain	18	4.8
Nausea	100	29.7	Metemesis	8	1.5
Vomiting	98	29.1	Convulsion	2	0.6
Epistaxis	92	27.3	Haematemesis	1	0.3

In most cases the incubation period was 5 to 11 days. The onset was generally sudden, the first symptoms being fever, chilliness, headache and pain in muscles and bones, associated with anorexia. The number of febrile attacks without treatment seems to be 3 to 5 and the duration of each varies from 4 to 10 days with an average of 7 days. In 74 patients the first remission varied from 3 to 16 days, the average being 7.1 days.

Splenomegaly was observed in 69.2 per cent, and enlargement of the liver in 40.7 per cent of the patients. Jaundice occurred in 29.4 per cent, haemorrhagic skin rash in 34.7 per cent, general glandular enlargement in 18 per cent, some patients had cerebral symptoms. Pneumonia occurred in 5 per cent, and was a very serious complication, accounting for 8 out of 21 deaths in this series.

The blood was examined in each patient. Only 60 per cent. showed leucocytosis varying from a slight to a marked degree. The erythrocyte count showed anaemia with counts varying from 1 to 3.9 million in 31.7 per cent of the cases. The haemoglobin content was low but not severely so in most instances.

Slight albuminuria occurred in 195 cases, of which 97 showed casts and 34 haematuria.

The patients were generally treated as soon as spirochaetes were found in the blood, by injections of neocarsphenamine. The average time for the disappearance of spirochaetes was 15½ hours after treatment and out of 28½ treated cases 16 required a second treatment. The dose was usually 10 mgm per kilo body weight. Finally the author

gives a list of the complications and associated conditions in these relapsing fever patients the most common being syphilis opium addiction and scabies. E H

DIGONNET (L.) & MATHIS (Maurice) Spirochétose récurrente africaine à tiques évoluant chez une femme enceinte [Tick-transmitted African Relapsing Fever developing in a Pregnant Woman.]—*Bull Soc Path Exot* 1939 Feb 8 Vol 32 No 2 pp 143-145

The description of a case of relapsing fever in a woman at Dakar infected by the bites of *Ornithodoros erraticus* during the second month of pregnancy who in spite of two relapses and various signs suggestive of abortion or premature delivery completed the gestation and gave birth to a normal infant

The patient received without any apparent inconvenience 2 10 gm of sulpharsenobenzol intramuscularly and 4 5 gm of trypanamide intravenously At birth the blood from the umbilical cord was inoculated into rats with negative results

The authors consider that the early treatment was largely responsible for the favourable course of the disease and of the pregnancy

E H

SIMONS (H) Nouvelle méthode d'enrichissement pour certains spirochètes sanguicoles au moyen de taurocholate de bleu de méthylène [A New Method of concentrating Certain Blood Spirochaetes by Means of Taurocholate of Methylene Blue.]—*Ann Parasit Humaine et Comparée* 1939 Jan. 1 Vol 17 No 1 pp 62-68. [10 refs]

The author has developed a system first recommended by HOEFER (1919) for the diagnosis of certain protozoal infections of exposing 10 cc. or more of the blood or other material to be examined to a haemolytic system which will dissolve the blood elements but leave the parasites.

It has been generally believed that 10 per cent sodium taurocholate dissolved spirochaetes but the author finds that *S. gallinarum*, *S. duttoni*, *S. persica* and *S. turicatae* persist for several weeks in such a solution although *S. pallida* and *S. icterohaemorrhagiae* are rapidly attacked Accordingly a technique has been developed for the examination of spirochaetes in blood and other tissues employing this cytolytic agent. 2 cc. of 10 per cent sodium taurocholate dissolved in sodium citrate solution or physiological saline is mixed with 1 cc. of saturated methylene blue dissolved in saline This mixture will keep or about one month if preserved in a well corked bottle preferably in the ice chest.

For the examination of blood containing moderate numbers of spirochaetes 2 to 4 loopfuls of the taurocholate and stain are mixed on slide with an equal quantity of the infected blood. After a few seconds the drop is covered and can be examined by direct illumination when almost all traces of the blood cells will be found to have disappeared and the spirochaetes coloured blue are readily seen If very few spirochaetes are present it is possible to collect together all the material left on the slide as the organisms are entangled in a coagulum and all cellular elements disappear In this way one can

TABLE

Showing the minimum lethal concentration in vitro at 37°C of various compounds for normal and solganal-fast strains of spirochaetes and for normal trypanosomes.

Drug	Minimum lethal concentration γ per ml.						Ratio between trypanocidal and spirochaetocidal activity
	Normal spirochaetes		Resistant spirochaetes		Trypanosomes		
	Within 8 hours	Within 24 hours	Within 8 hours	Within 24 hours	Within 6 hours	Within 24 hours	
Reduced trypanamide	0.6	0.16	1.2	0.3	0.04	0.008	15-20
Benzyl-arsenoxide	0.13	0.06	—	—	0.003	0.002	30-40
Reduced stovarnol	0.5	0	—	—	0.3	0.07	1-3
Reduced osamine	0.3	0.16	—	—	0.03	0.007	10-20
Reduced neocryl	0.8	0.16	—	—	0.06	0.007	15-20
L.352	0.8	0.2	—	—	0.03	0.01	20-30
Barosan oxide	2.5	0.3	—	—	1.2	0.3	1-2
2-carboxy-phenyl di-chlorarsine	7.0	—	—	—	7.0	0.8	1-3
Solganal	0.6	0.3	1.25	0.6	0.03	0.02	8-15
Arsenous oxide	160.0	80.0	160.0	80.0	1.0	0.3	166-270
Tartar emetic	250.0	200.0	250.0	200.0	0.5	0.16	800-1,200
Diammo-methyl-scrudine	1.25	0.4	1.25	0.5	0.13	0.02	8-25
Solganal	80.0	50.0	80.0	50.0	800.0	50.0	0.2:1

and solganal-resistant strains, but the resistance of the strain to this drug never became complete even after 70 passages.

E. H.

SKRANTZ (André) (In Memoriam) La fièvre récurrente hispano-nord-africaine en Algérie (Spanish-North-African Relapsing Fever in Algeria).—*Arch. Inst. Pasteur d'Algérie* 1938 Dec. Vol. 16, No. 4 pp 403-450. With 19 figs (2 on 1 plate) [17 refs]

[See this Bulletin 1939 Vol. 38 p. 108]

LEPTOSPIROSIS

PRECIS OF ABSTRACTS IN THIS SECTION

BESSEMAN and his co-workers (p. 769) deduce from examination of urine and the results of serological tests of dogs and of a few suspicious cases of jaundice in man, that leptospiral infections are rare occurrences in Belgium. In Dalmatia, on the contrary, TARTAGLIA (p. 768) proved its presence in eleven agriculturists and fishermen and found also that in certain districts in the environs of Metkovic up to 20 per cent. of the rats examined were harbouring the organism. MONTESIRUC and his colleagues (p. 770) describe two cases in Martinique one ending fatally—these are believed to be the first recorded in the island. The succeeding four papers abstracted deal mainly with the clinical aspect. SJÖSTRÖM of Sweden (p. 770) relates three fatal cases, in one of which death took place on the eighth day of illness. Though these

three occurred in separate years the author is of opinion that the disease is not very rare in that country. DENÉCHAU and MANDROUX (p 771) mention a case with an incubation period of 17 days the patient recovered after an illness of 13 days during which he exhibited meningeal symptoms but strange to say no jaundice. The next two also describe meningeal symptoms. MURGATROYD's record (p 771) is of a very chronic case in which the leptospira was recovered from the cerebrospinal fluid up to eight months after the onset of illness. In ESCHBACH's patient (p 771) in addition to the symptoms of encephalomyelitis there was a cutaneous eruption with adenitis. [It seems to be taken for granted that all these were aetiologicaly connected with the leptospiral infection.]

CARLINFANTI (p 771) has studied the antigenic properties of *Leptospira icterohaemorrhagiae* employing alcoholic extracts of various strains and suggests that the reaction which occurs between syphilitic sera and leptospiral lipids may be due to a common alcohol-soluble partial antigen. MORROW and his fellow workers (p 772) describe the cultivation of *L. icterohaemorrhagiae* on fowl embryo chorio-allantoic membrane and PAPAGEORGIU (p 773) by serological investigations comprising the complement fixation tests employing phenolized cultures as antigen and by agglutination methods comes to the conclusion that the various strains—human canine and slime fever strains—are antigenically related. Though some sera gave agglutination but not complement fixation most yielded accordant results with both tests. H H S

BESSEMANS (A) WITTEBOLLE (P) & DE BORCHGRAVE (O) *Leptospiroses canicole et ictérohémmorragique en Belgique* [*Leptospira canicola* and *L. icterohaemorrhagiae* in Belgium.]—*C R Soc Biol* 1938. Vol. 129 No 32. pp 906-908 [22 refs.]

The authors examined the urine of 86 dogs from the neighbourhood of Ghent for the prevalence of leptospiral infection with uniformly negative results. The serological examination of 68 also gave negative results, except in the case of one dog which was jaundiced and whose serum produced lysis of *L. canicola* at first in dilutions of 1 500 and eight days later up to 1 5 000. Serological tests with *L. icterohaemorrhagiae* were negative.

In addition the authors examined various human sera including 3 suspected cases of jaundice 5 from Waken and 358 Wassermann sera. Of these only 2 of the latter were positive 1 lysing *L. canicola* up to 1 200 and the other *L. icterohaemorrhagiae* up to 1 500. It would seem therefore that leptospiral infections are rare in Belgium.

E Hindle

TARTAGLIA (Pierre) *La spirochétose ictéro-hémorragique en Dalmatie*. [*Spirochaetal Haemorrhagic Jaundice in Dalmatia.*]—*Bull Office Internat d'Hyg Publique* 1939 Mar Vol. 31 No. 3. pp 478-481

A description of 11 cases of Weil's Disease in Dalmatia all of which were diagnosed by serological tests.

Two of these cases occurred at Split and 9 in the neighbourhood of Metkovic 9 of them had showed jaundice and 2 were without it. All the patients with one exception were agriculturists and 9 of them

engaged in eel fishing in fresh water where they might be exposed to contamination. Wild rats were found to harbour the infection near Metkovic, the percentage of rats showing spirochaetes ranging from 11 to 20 per cent. The pH of the waters in that neighbourhood varied from 6.7 to 7.0 which would favour the survival of spirochaetes entering the water as a result of contamination with the urine of infected rats. E H

MONTASTRUC (E), DE PALMAS (M), PIGNON (A.) & MACALLOX GRANGEAU (E). Premiers cas de leptospiroses diagnostiqués à la Martinique. (The First Cases of Leptospirosis Diagnosed in Martinique.)—*Bull Soc Path Exot* 1939, Nov 9 Vol. 31 No 9 pp. 824-829

The description of two cases in Martinique, one fatal, presenting symptoms suggestive of Weil's disease. Leptospira were found in the urine of the first case and in liver smears from the second (fatal) case. Attempts to isolate the organism by guinea-pig inoculation and by culture methods were unsuccessful, but the clinical symptoms were characteristic. About the same time as these two cases, there were numerous cases of a disease resembling dengue and it is suggested [on very slight evidence] that these might have been mild cases of a leptospiral infection. E H

MOONTAN (A.) & ESSEVELD (H). Over de frequentie van leptospirose in Ned Indië. (The Frequency of Leptospirosis in the Netherlands Indies.)—*Geneesk Tijdschr v Nedert Indië* 1939 Feb. 23, Vol. 79 No 9 pp. 547-563 [60 refs.]

SJÖBERG (Sven-Gösta). Malignant Cases of Weil's Disease with Special References to Early Diagnosis.—*Acta Med Scandinavica*, 1939 Vol. 88, No. 6, pp. 538-541 [14 refs.]

A history of a fatal case of Weil's disease occurring in a clerk who lived near Stockholm and suddenly developed the disease without knowledge of any exposure to infection (rats, etc.) but since he lived by a lake known to contain leptospira pathogenic to dogs, this may have been the source of infection. The early symptoms suggested influenza but jaundice developed on the 5th day, then collapse, hypotension, anuria, uremia and death on the 8th day. Hyperglycemia, a rare symptom, was also present.

Two similar fatal cases occurred in the same hospital (Seraphimer) in 1934 and 1935. The diagnosis was confirmed by blood cultures which were positive on the 5th day of the disease, by the injection of guinea-pigs with urine and the presence of spirochaetes in the liver.

The author is of the opinion that Weil's disease in Sweden is not very rare and advocates the use of blood cultures to arrive at an early diagnosis in suspected cases, since serum therapy should commence as soon as possible. E H

- DENÉCHAU (D) & MANDROUX (J) De la durée de l'incubation de la spirochétose (Leptospirose) A propos d'un cas à forme anictérique et méningée à infestation d'origine murine nettement précisée [The Duration of the Incubation of Spirochaetosis (Leptospirosis) Concerning a Meningeal Case without Jaundice, with a Definite Origin from Rat Infestation.]—*Bull et Mém Soc Méd Hôpît de Paris* 1939 Feb 20 55th Year 3rd Ser No 5 pp 212-216 [10 refs.]

The description of a case of Weil's disease without jaundice in a butcher who became infected 17 days after skinning a guineapig that had been killed by rats which is presumed to have been the source of the infection. The patient developed meningeal symptoms but recovered after an attack lasting 13 days. E H

- MURGATROYD (F) Further Note on a Case of Chronic Leptospiral Meningitis [Memoranda.]—*Brit Med J* 1939 Mar 4 pp 445-446

Further notes on a case of chronic meningitis in Weil's disease. [See this *Bulletin* 1937 Vol. 34 p 359.]

In view of the recovery of leptospira from the patient's cerebro-spinal fluid 6 and 8 months respectively after the onset of the disease, it had been suggested that the guineapigs used for the diagnostic inoculations might have suffered from extraneous infections.

This patient's serum more than two years after his attack has recently been examined by Major H. C. Brown, and found to agglutinate leptospira to a titre of almost 1 in 1000. These results confirm the original diagnosis and show that this patient had acquired a leptospiral infection which remained active for more than eight months. E H

- ESCHBACH (H) Spirochétose avec plaie cutanée adénite et méningite [Spirochaetosis with Cutaneous Sores, Adenitis and Meningitis.]—*Bull et Mém Soc Méd Hôpît de Paris* 1939 Mar 6 55th Year 3rd Ser No 7 pp 290-291

The record of a case of Weil's disease in a 12 year-old child who showed reactions of the lymphatic glands accompanying a cutaneous eruption and meningo-encephalitis. E H

- CARLINFANTI (E) Studien ueber die antigenen Eigenschaften der *Spirochaeta icterohaemorrhagiae*. [Studies on the Antigenic Properties of *Spirochaeta icterohaemorrhagiae*.]—*Ztschr f Immunitätsf u Experim Therap* 1938 Dec. 12. Vol. 94 No 5/6 pp 426-436

The author tested the properties of alcoholic extracts of various strains of *Leptospira* including two Weil strains Chinese, and rat 104 one dog strain 803/04 and a strain Moscow of *S. grippotyphosa*.

The extracts were prepared by growing each strain in 5 litres of 10 per cent rabbit serum with 90 per cent. tap water and after passing through filter paper centrifuging the well grown cultures for an hour

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The extracts were prepared by growing each strain in 5 litres of 10 per cent rabbit serum with 90 per cent. tap water and after passing through filter paper centrifuging the well grown cultures for an hour

Ten volumes of 96 per cent. alcohol were then added to the sediment and the mixture left in the incubator shaken from time to time and finally filtered. The filtrate containing the extract was diluted with 10 to 15 volumes of normal saline before being used.

Rabbits inoculated with strains of living or dead leptospira developed immune sera which gave specific complement fixation with these alcoholic extracts and also positive flocculation tests. These reactions occurred not only between extracts of any particular strain and its homologous antiserum, but also between extracts of heterologous strains and various leptospiral antisera. However leptospiral antisera gave completely negative reactions with Wassermann antigens. It would seem that the antisera react only with leptospiral lipoids and not against a ubiquitous lipoid, as in the case of *S. pallidus*.

The serum of patients with Weil's disease and of dogs infected with Stuttgart disease was found to react with leptospiral extracts but not infrequently positive results were also obtained with alcoholic organ extracts. The serum of mice infected with relapsing fever and of rabbits immunized against various bacteria, gave no reaction with leptospiral extracts. Positive Wassermann sera of syphilitic patients gave negative reactions when the leptospiral extracts were used as antigen, but gave positive flocculation tests.

It seems not unlikely that this reaction between syphilitic sera and leptospiral lipoids depends on the presence in both the leptospira and Wassermann antigen of a common alcohol-soluble partial antigen.

These results are of especial interest as they show the application to other infections of Hirschfeld and Klinger's flocculation test for the serum diagnosis of syphilis.

E H

MORROW (Grant) SYVERTON (Jerome T) STILES (William W) & BERRY (George Packer) The Growth of *Leptospira icterohemorrhagiae* on the Chorio-Allantoic Membrane of the Chick Embryo—*Science* 1938 Oct. 21 Vol. 88, No 2238, pp 384-385

The authors have succeeded in growing a human strain of *Le. icterohemorrhagiae* on the chorio-allantoic membrane of the fowl embryo.

Eggs that had been incubated for ten days were each inoculated on the chorio-allantoic membrane with 0.1 cc. of a positive culture. Transfers were made every four or five days by grinding up two or three membranes in Locke's medium to make a 10 per cent suspension and inoculating 0.1 cc. The spirochaetes were carried through twenty successive passages in developing eggs and every five passages guinea pigs injected with the "transfer inoculum." In every case these animals became infected and died in six to eight days with typical symptoms of Weil's disease.

The organisms were found to invade the tissues of the developing embryo and produced death within six to seven days. Grossly the membranes showed grayish opaque pin-point nodules, the result mainly of localized proliferation of the ectoderm cells, and of oedema, proliferation of the fibro-blasts and infiltration of a few inflammatory cells in the mesoderm. Sections stained by Levaditi's silver method showed the presence of spirochaetes both in the membranes and embryos.

E H

PAPAGEORGIU (S) Ueber die Komplementbindungsreaktion bei Leptospirosen [The Complement Fixation Test for Leptospira].—*Ztschr f Immunitätsf u Experim Therap* 1938. Dec 12. Vol 94 No 5/6 pp 489-504 [37 refs.]

The author has made a comparative study of the complement fixation test and agglutination reactions of 31 sera from various cases of typical Weil's disease also of dog and slime-fever strains and in addition of monovalent immune sera against ten various leptospiral strains

As antigen for the complement fixation tests well-grown cultures were killed by the addition of 0.3 per cent. phenol and after passing through filter paper centrifuged for at least four hours at 3 000-3,500 revolutions.

The results of the tests show that in a large number of sera similar results are obtained with both the complement fixation test and agglutination. In some cases however a serum would give a positive agglutination reaction whilst the complement fixation test was negative. Whilst the agglutination showed a constant strain or group specificity the complement fixation test seemed to have a greater range in its reaction.

The results confirm the generally accepted view that antigenically the different strains of leptospira are all more or less related.

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RAT-BITE FEVER.

PRÉCIS OF ABSTRACTS IN THIS SECTION

COLARUSSO (p 773) records two cases both diagnosed on the grounds of history and symptoms, for the spirillum was not seen in the blood of either patient. One was a boy of 14 the other a man of 52 years both were bitten on the finger and in both cases symptoms set in after the wound had apparently healed completely. In YAMAMOTO's contribution (p 774) and in the succeeding article are recorded cases of sodoku following bites by cats. Two of the three were typical in course the third developed a complicating periorchitis and epididymitis. MOLLARET and BONNEFOI (p 774) discuss the rôle of the cat in transmission of sodoku and point out that further investigation is needed to decide whether the cat is a true reservoir of the spirillum or whether it acts as an incidental transmitter from an infected rat which it has killed or eaten.

H H S

COLARUSSO (Andrea) Su due casi di sodoku. [Two Cases of Rat-Bite Fever].—*Riforma Med* 1938 Dec. 3 Vol. 54 No 43 pp 1839-40 1843-4 1845-6 [26 refs.]

The first patient was a lad of 14 years bitten on the finger by a field rat which he was trying to capture. The wound healed without treatment. Four weeks later he felt local pain and had a rigor with typical fever course and enlargement of regional glands. The second was a man of 52 years also bitten on the finger and in his case too the

Ten volumes of 96 per cent. alcohol were then added to the sediment and the mixture left in the incubator shaken from time to time and finally filtered. The filtrate containing the extract was diluted with 10 to 15 volumes of normal saline before being used.

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wound healed untreated, but the finger swelled and became painful and inflamed and was incised, pus being expected, but only blood appeared. Both patients exhibited the usual symptoms and the disease ran a typical course. The diagnosis was made on the history and symptoms for in neither was the spirillum found on blood examination.

H H S

YAMAMOTO (Semosuke) Rattenbuckkrankheit durch Katzen-Biss (od. Kratz) [Ratoku caused by the Bite of a Cat].—*Japanese Jl Dermat & Urol.* 1938 Oct 20 Vol 44 No 4 pp. 118-119. [Summary appears also in *Bulletin of Hygiene*]

The author records two cases, one a man of 35 the other a boy of 11 years, each bitten on a finger by a kitten. One week and two weeks later respectively the patients suffered with fever adenitis and an erythematous rash. Inoculation of the blood into mice led to the discovery of *Sp. muris* in each case.

H H S

MOLLARET (P) & BOCKYEROT (A.) Un cas de Biokoshio (Sodoku après griffade et morsure de chat) avec périorchite résolutive. Considérations sur le rôle du chat dans la transmission de *Spirillum morsus muris*. [A Case of Biokoshio (Ratoku from the Scratch and Bite of a Cat) with Resolutive Periorchitis. Considerations on the Role of the Cat in the Transmission of *Spirillum muris*.]—*Bull Soc Path. Exot* Nov 9 Vol 31 No 9 pp. 853-868 With 1 chart. □

Malaria is only feebly endemic in Coquilhatville in the Congo SCHWETZ and BAUMANN (p 777) found low infection rates at all ages but higher in adults than children *A. marshalli* var *moucheti* a potential vector is common, but *A. gambiae* was not seen *P. vivax* was not found The films were taken at the most unhealthy time of the year In a further investigation in the lower reaches of the Congo River basin however SCHWETZ and GERONVEZ (p 777) found low rates in Thysville 800 metres above sea level and well away from the river very high rates at Luozi on the river bank and moderate rates at Timanzi 750 metres above sea level and away from the river *P. vivax* was common at Luozi but rare in the other two places The examinations were made at the end of the dry season In the Kwango River area the same authors (p 778) found high parasite rates in children with many gametocytes though parasites were not numerous In the river-side places *A. gambiae* was very prevalent *P. vivax* was rare and *P. falciparum* and *P. malariae* were about equally prevalent These examinations were made in the dry season

In Holland according to VAN THIEL and BEVERE (p 778) *A. maculipennis atroparvus* prefers pig to man in the proportion of 12 to 1 and in Italy *labranchiae* and *clutus* appear to prefer man though the results were not so marked In Hanoi CHEDECAL (p 779) observed that horses proved attractive to *A. vagus* and *A. hyrcanus* var *sinensis* which though common in stables were rarely found in adjacent houses This fact is of value in prophylaxis VARGAS (p 779) in Timuxco found that 33 per cent. of 420 *A. pseudopunctipennis* preferred to feed on man when given an equal opportunity of feeding on animals

In the *Bulletin de l'Office Internationale d'Hygiène Publique* it is shown that in Egypt *A. pharoensis* is a common vector and *A. sergenti* a probable vector In the Congo DUREN (p 780) found that the species carrying malaria are *A. gambiae* *A. funestus* *A. moucheti* *A. nili* *A. pharoensis* and *A. rufipes* but the last two are so rare that their rôle in this respect is negligible

BOYD and MATTHEWS (p 780) investigated two patients 7 years after infection with the McCoy strain of *P. vivax* Immunity was clearly present although no parasites were found in their blood when tested by injection into other patients Reinfection with heavy doses of the same strain produced only slight parasitological responses and a slight clinical attack in one patient only The antigenic identity of the parasite has therefore been maintained through 40 passages in man and anophelines.

In endemic areas SICAUT and MESSERLIN (p 781) observed that although spleen and parasite rates decreased with age the serological index increased Of the inhabitants 44 per cent showed neither parasites, enlarged spleen nor positive melanoflocculation and were no more prone to febrile attacks than those showing evidence of infection The authors therefore consider that a true immunity not depending upon the existence of parasites in the body may develop side by side with premunition DECOURT (p 782) states his experience that the value of Henry's reaction has been established but that a positive result does not always indicate parasites in the blood The intensity of the reaction in naturally acquired malaria varies directly with the number of attacks He postulates a non-specific as well as a specific immunity but Henry's reaction cannot distinguish between them.

JOLLY and DANGLEMONT (p 782) from a study of two cases of pernicious *P. falciparum* malaria note an early marked increase of

the blood urea. Heavy infections with all stages of schizontic forms were present and owing to the rapid destruction of parasites and red cells the phagocytes were unable to deal with the debris. Mobilization of phagocytes may contribute to capillary embolism and blocking of the kidneys and the resulting coma is both parasitic and toxic. Prognosis depends on attempts to restore renal function.

SCHWETZ (p. 783) discusses congenital malaria, considering it to be an incident in acute malaria of the mother. In populations suffering from endemic afebrile malaria the results of investigations of congenital malaria are consistently negative.

GARDNER and DEXTER (p. 783) report a patient infected by *P. malariae* after a blood transfusion from a donor who had not had an attack of malaria for 17 years, during which time he had lived in northern U.S.A. No parasites could be found in the blood of this donor. Successful treatment with sulphathiazide is recorded.

TECHILON (p. 784) reports a case of what he regards as paramalarial hepato-splenomegaly with infantilism. ROGER and BOUDOUVERGUES (p. 784) have seen only one case, in 15 years, in which they were satisfied that polyneuritis was caused by malaria. Many malarial patients attend their clinic.

PRI DIBBOSE (p. 784) gives a method for the detection and estimation of quinine in urine, blood or vacera. For details the original abstract should be consulted.

In treatment MALYCKEVA (p. 785) obtained rather better ultimate results by spreading the administration of atequine (atebrin) over 11 days in a period of one month than as a 7 consecutive days course. TERCHLER (p. 785) considers that short courses of atequine 0.1 gm. three daily for 3 days, can maintain the health of a native labour force in highly malarial districts of Tanganyika Territory. CROPPA and BASO (p. 786) report that treatment of 3 gametocyte carriers of *P. falciparum* with cibonal and atequine for 5 days did not prevent infection of 4 *stephensi* from them.

The results of the treatment of benign and malignant tertian malaria with prontosil rubrum and prontosil soluble obtained by MINA and MOHR (p. 786) were unsatisfactory. The state of immunity is probably a factor in this treatment. But FARRAUX and RAGNOT (p. 786) report that the schizonticidal action of solaseptazine justifies its use.

VAN RIEL (p. 787) found that cuprochin was ineffective in *P. falciparum* malaria.

Acute treatment was successful in the hands of SERRA (p. 787).

In discussing the relationship between irrigation and malaria in India RISSALL (p. 787) points out that it is defective irrigation which is responsible. Many items are detailed but perhaps the most important are the absence of drainage canals and general untidiness through neglect of proper maintenance and planning of the canals and channels. Sub-sol water has in places risen greatly through the effects of barrage construction. He urges organization and co-operation between all agencies concerned, but his detailed recommendations are to be published later.

AFANASSIEV (p. 788) has tested and recommends the distillate of coke filters obtained in the final stages of fractional distillation of Russian petroleum for the destruction of anopheline larvae in nature, using doses generally employed with petroleum.

ROY (p 789) does not consider that the small fish *Panchax panchax* common in Bengal is of much value in anti larval work. C W

WATSON (Malcolm) *Malaria and Mosquitoes Forty Years On.*—Paper read before the Dominions and Colonies Section of the Royal Society of Arts on Feb 7 1939 [Uncorrected proof.]

This is an interesting narrative of the progress in the prevention of malaria since Ross made his discovery in 1898. Ross's hopes and disappointments early failures in attempts at anopheline control and their effect in retarding malaria prevention successes in Panama and Malaya species sanitation recent progress in many parts of the world and the contribution to malaria control made by the Ross Institute are graphically described. Norman White

SCHWETZ (J) & BAUMANN (H) *Recherches sur le paludisme endémique chez les noirs de l'agglomération de Coquilhatville* [Endemic Malaria among Native Inhabitants of Coquilhatville]—*Ann Soc Belge de Méd Trop* 1938 June 30 Vol 18 No 2 pp 259-276

A very careful parasite survey revealed the surprising fact that malaria in Coquilhatville is very feebly endemic. Coquilhatville is situated on the Equator at the junction of Ruki River with the Congo. The climate is therefore hot and moist and the seasons are little marked. The blood films were taken at the most unhealthy time of the year. An insignificant number of infants below the age of two years was found infected the proportion of infected among children from 3 to 5 was slightly higher but here again the number of parasites harboured by the infected was very small. Between ages 5 to 10 the proportion infected was about the same as for the 3-5 age group but the parasites were somewhat less numerous. Thereafter there was a progressive diminution of the numbers infected and the parasites harboured till adult age. Low as was the degree of infection of adults it was higher than that of infants a very exceptional finding in the Congo. Gametocyte carriers were very rare. *P. vivax* was not found at all and *P. malariae* was extremely rare. Mosquitoes are very numerous. The most common anopheline in Coquilhatville was *A. marshalli* var *moucheti* a potential vector. *A. gambiae* almost ubiquitous in the Congo was not noted. Further observations will be awaited with interest.

N W

SCHWETZ (J) & GERONNEZ (E.) *Sur le paludisme endémique du Bas-Congo IV—Le paludisme chez les noirs de la région des Cataractes.* [Endemic Malaria among Inhabitants of the Cataract Region of the Lower Congo.]—*Ann Soc. Bdge de Méd Trop* 1938. June 30 Vol 18 No 2. pp 277-282.

This note records the results of the examination of 275 natives, mostly children in September-October the end of the dry season in three places in the Cataract Region between Leopoldville and Matadi. Thysville about 800 metres high, is on the Leopoldville Matadi railway line. Luiza is on the bank of the river Timanzi between the river and the railway is about 750 metres high on a plateau. In Thysville the proportion of infected was low and in them parasites were few. *P. vivax* was very rare. In Luiza the infection rate was very

high, parasites were very numerous and double or triple infections were common, as were gametocyte carriers. *P. vivax* was much in evidence. The spleen rate of the 71 children examined was 78.9 per cent. and the parasite rate 85.8 per cent. In Tumana there was a spleen rate of 40 per cent. and a parasite rate of 82 per cent. (73 children examined). Parasites were relatively few in numbers, mostly discoverable only in thick drops. Very few cases of *P. vivax* infection were noted. The different degrees of endemicity in three adjacent places is noteworthy.

V IV

SCHWETZ (J) & GEROSVEX (E.) Sur le paludisme endémique du Bas-Congo. I.—Le paludisme chez les noirs de quelques agglomérations riveraines du Kwango. [Endemic Malaria among Natives in Certain Villages on the River Kwango, Lower Congo].—Ann. Soc. Belg. de Méd. Trop. 1938. June 30. Vol. 18. No. 2. pp. 283-289.

A note on the findings in blood films of 296 natives living between Popokabaka and the Wilham Falls gives an indication of the degree of endemicity of malaria in the Kwango region. The films were taken in the dry season. Everywhere *A. gambiae* was the prominent vector. In Popokabaka 23 out of 24 infants between 9 months and 2 years harboured parasites. 23 out of 23 children from 2 to 5 years. 16 out of 23 children from 6 to 14 and 6 out of 19 adult women. Parasites were relatively few in number. *P. malariae* was very frequently found. *P. vivax* was seen in only 3 cases. A large proportion of infants below 5 years harboured gametocytes. In Kasongo Linda 23 infants up to 5 years of age were all infected as were 28 out of 30 children from 6 to 14 years. Twenty out of 42 adult women harboured parasites. Here again parasites were few in number. In children from 2½ to 5 years more than half the parasites were *P. malariae*. *P. vivax* was seen only once. In Mahonga on the Kasanga plateau, where no anophelines were found, only 1 of 9 infants below 2 years was infected. 10 of 12 children from 3 to 5. 7 of 22 from 5 to 14 and 10 of 96 adults. Parasites were few in number. In Holomoni near the Francis Joseph Falls 8 of 7 children below 4 years were infected. Above that age only 1 of 16 examined harboured parasites. All the places mentioned except Mahonga are situated on the Kwango River. In these river-side places *A. gambiae* is very prevalent. Though the percentage infected was high parasites were few. *P. falciparum* and *P. malariae* were almost equally prevalent, *P. vivax* very rare. The proportion of *P. malariae* infections on the Kwango River is unusually high.

V IV

van THIEL (P) & BEVERE (L.) Preuve expérimentale de l'anthrophilie d'*Anopheles maculipennis labranchiae* et *clutus*. [Experimental Proof that *Anopheles maculipennis labranchiae* and *clutus* prefer Human Blood.].—Bull. Soc. Path. Exot. 1939. Jan. 11. Vol. 32. No. 1. pp. 103-109.

The authors have offered man and pig to *Anopheles* which were confined in a very large cage under conditions which approached the natural.

The experiments were carried out in a large cage of mosquito netting, measuring about 18 x 23 ft. x 7 ft high. In this a man and a pig spent

the night in small chambers mosquitoes liberated in the main cage could enter either small chamber but could not escape from it. The apparatus appears to be simpler and therefore better than that previously described by REUTER [see this *Bulletin* 1937 Vol 34 p 630]. Working in Holland the authors found that the local *aloparvus* prefer pig to man the numbers attacking the two hosts differing on the average of 12 to 1. The apparatus was then moved to the province of Foggia Italy and tested with *labranchiae* and *clutus* which were caught in stables kept for one to three days and then liberated in the large cage. A number of difficulties were encountered and the figures which are given at length are not perhaps quite conclusive though perhaps statistical tests appropriate to small numbers would be helpful. Generally speaking it seems that man was bitten by about twice as many of these mosquitoes as pig.

P A Buxton

CHEDECAL. Contribution à l'étude du comportement trophique des anophélines à Hanoi. (Enclos du 9e R.I.C.) Feeding Characteristics of Anophelines in Hanoi.—*Rev Méd Française d'Extrême-Orient* 1938 Oct Vol 21 No 8. pp 1007-1011.

Urbanization has much diminished the prevalence of anophelines in Hanoi but there are areas where they are still to be found. Among these is the citadel in which the 9th R.I.C. are stationed. The lines contain stables which accommodate 160 horses. Anopheles found were *ragus hyrcanus* var *sinensis tessellatus* and *aconitus*. *A. ragus* and *A. sinensis* were much the most prevalent. There was no locally contracted malaria during the seventeen months of the observations the 84 cases that did occur among the garrison of 900 were all old infections. No case of malaria occurred among the officers children housed nearby. Anophelines were very rarely found in human habitations but they were always present in large numbers in the stables. Of engorged anophelines only 0.9 per cent. of *sinensis* contained human blood and only 2.7 per cent. of *ragus*. Nearly all the others contained horse blood. The attraction of horses for anophelines is thus marked and is of value in prophylaxis.

A W

VARGAS (Luis). Observaciones sobre la preferencia alimenticia sanguinea de la *Pseudopunctipennis* en Temixco Morelos. [Blood Preferences of *A. pseudopunctipennis* in Temixco.]—*An Inst Biol Mexico*. 1938 Mar & June Vol 9 Nos 1 & 2. pp 201-208.

In Temixco which is highly malarious, *A. pseudopunctipennis* is the sole vector. Of 245 engorged females of this species captured in houses 67.6 per cent. contained human blood. By the use of mosquito traps such as those described by EARLE & HOWARD as used in Porto Rico [this *Bulletin* 1937 Vol 34 p 636] *A. pseudopunctipennis* was given equal opportunities of feeding on man or one or other of several of the lower animals. Of 420 mosquitoes with equal facilities of feeding on man or cow 33 per cent. fed on man. Of 677 mosquitoes with a horse as an alternative food supply to man 27 per cent. selected man.

N IV

BULLETIN DE L'OFFICE INTERNATIONAL D'HYGIÈNE PUBLIQUE. 1938. Dec. Vol. 30. No. 12. pp. 2789-2792.—La transmission du paludisme par les diverses espèces d'anophèles égyptiens. [Transmission of Malaria by Egyptian Species of Anopheles.]

The most prevalent species of *Anopheles* in Egypt are *pharoensis multicolor mauritanicus* and *sergenti*. Other species found with a local distribution, and playing no part in the spread of malaria in the Nile valley, are *rhodensis (dihali)*, *superficulus aegypti* and *turkhardi*. *A. pharoensis* is readily infected in the laboratory and has been found infected in nature. It is commonly found in human habitations. It explains the relation between rice cultivation and malaria prevalence: rice fields are favoured breeding places. It is the most prevalent anopheline in Egypt. *A. multicolor* has never been found infected and it is very rarely found in human habitations though these be close to breeding places of this species. *A. sergenti* has been found harbouring oöcysts but not sporozoites. It is easily infected experimentally. It is very probably a vector. *A. mauritanicus* enters habitations and bites man but it has not been found naturally infected: an attempt to infect it experimentally failed. A 17

DUKES (A.) Etat actuel de nos connaissances sur les anophèles du Congo belge. [Present Knowledge of Anopheles of Belgian Congo.]—Ann Soc Belg de Méd. Trop. 1938 Dec. 31 Vol. 18. No. 4 pp. 557-580. With 5 maps. [13 refs.]

The author has gathered together all available information concerning the species of Anopheles that have been found hitherto in the Belgian Congo. Maps illustrate the distribution of the most prevalent species. Following the recent classification of EDWARDS and EVANS the list of Anopheles contains 32 species and 6 varieties. The only species that have been incriminated as vectors of malaria are *gambiae fuscipes*, *mosaici*, *nilis pharoensis* and *rufipes*. The two last named are so rare that their importance as transmitters is negligible. It is not possible to summarize in small space the large amount of information that this paper contains. N 17

BATES (Marston) Hybridization Experiments with *Anopheles maculipennis*.—Amer J Hyg. 1939 Jan. Vol. 29 No. 1. Sect. C. pp. 1-6. [17 refs.]

COVA-GARCIA (Pablo) Notas sobre los anofelinos de Venezuela y su distribución. [Anophelines of Venezuela.]—Bol. Ministerio de Sanidad y Asistencia Social. Caracas. 1939 Jan. Vol. 4 No. 1 pp. 7-69. With 10 plates. [37 refs.]

SENEVET (G.) & AMOYENX (E.) Quelques anophélins de la Guyane française. [Anophelines of French Guiana.]—Arch Inst Pasteur d'Algérie. 1939 Dec. Vol. 16 No. 4 pp. 493-512. With 10 figs. & 1 plate. [10 refs.]

BOYD (Mark F.) & MATTHEWS (Chance B.) Further Observations on the Duration of Immunity to the Homologous Strain of *Plasmodium vivax*.—Amer J Trop Med. 1939 Jan. Vol. 19 No. 1 pp. 63-67.

The first-named author reported in 1936 that an effective homologous immunity to the McCoy strain of *Plasmodium vivax* may endure for

more than three years. The conclusion was based on observations made on a patient who was re-examined from the same point of view in 1938 nearly seven years after the primary attack. Observations are also reported on another patient whose primary attack was almost contemporaneous with that of the first.

The first patient was first inoculated with the McCoy strain in December 1931 a primary attack lasting 22 days was followed by two relapses. Three and a half years later he was inoculated intravenously with 18 cc. of blood containing 180 million trophozoites of the same strain. There was no clinical reaction. In July 1938 he harboured no detectable parasites and inoculation of 10 cc. of his blood into a susceptible patient showed that he had no submicroscopic latent infection. He was then bitten by 10 infected mosquitoes nine days later parasites were detected and remained intermittently detectable for 15 days, though never more than 15 per cmm. There was no clinical reaction. The following month he was given an intravenous injection of 10 cc of infected blood containing 159 million trophozoites. There was no clinical or parasitological response whatsoever.

The second patient whose primary attack was in August 1931 was also shown to have no latent malaria infection in July 1938. He was bitten by 8 demonstrably infected mosquitoes nine days later parasites were detected and he experienced a clinical attack consisting of but one paroxysm. Parasites were detectable for 10 days the maximum density being 1100 per cmm. After the disappearance of the parasites he too received an intravenous injection of the same amount of infected blood and from the same source as the first patient received. Eight days later parasites were detected for three days but never exceeding 20 per cmm. There was no clinical reaction.

The observations show that during the period of more than six years the McCoy strain of *P. vivax* has maintained its original antigenic identity through 40 human-anopheline passages. A II

SICAULT (G.) & MESSERLEY (A.) *Index sérologique et prémunition dans le paludisme endémique* [Serological Index and Premunition in Endemic Malaria.]—*Bull. Soc. Path. Exot.* 1938. Dec. 14 Vol. 31 No 10 pp 911-915

The serological technique used in this inquiry was the authors micro-reaction [see this *Bulletin* 1939 Vol. 36 p 395]. In endemic areas the spleen, parasite and serological indexes were determined for persons in age groups as follows:—0-5 years, 127; 6-10 years, 105; 11-16 years, 69; adults, 498. The spleen index (44.9, 45.7, 52.1 and 25.8) and the parasite index (44.3, 31.4, 30.4 and 19.6) decrease as age advances; the serological index increases (25.9, 33.3, 39.1 and 52.4). During attacks of fever melano-flocculation is often negative. Nearly all patients with very large spleens in the absence of fever gave positive melano-flocculations. Among the inhabitants of an endemic area in relatively good health 44 per cent. showed neither parasites nor enlarged spleen nor a positive serological reaction. Six months observation showed that this portion of the population was not more prone to febrile attacks than those with some positive sign of malaria infection. The authors conclude that in endemic malaria side by side with premunition which is dependant upon the existence of parasites in the body a true immunity not dependant upon the existence of parasites may be developed. A IV

DECOURT (Ph.) Sérologie et Immunité au cours du paludisme. A propos de la communication de G. Sicault et A. Messerlin. [Serology and Immunity in Malaria with reference to the Work of Sicault and Messerlin.]—*Bull Soc Path Exot.* 1939 Jan. 11 Vol. 32. No. 1 pp 7-11

The author refers to a report by SICAULT and MESSERLIN on the determination of a serological index in a region of high malaria endemicity and to their discussion of malaria immunity [see above]. He contrasts their contentions with his own findings. Ten years observations of Henry's reaction in patients undergoing malaria therapy in Paris have confirmed the value of the reaction but a positive reaction does not always indicate the presence of parasites in the blood. In patients inoculated by injection of infected blood the reaction becomes positive after a certain number of febrile attacks a positive reaction may persist after the cure of the patient, involving the eradication of the parasite, for a period longer than the duration of the malaria infection. Patients infected by injection of infected blood in non-malarial regions never relapse. In naturally acquired malaria the intensity of the reaction varies directly with the number of attacks of malaria from which the patient has suffered. In addition to a specific immunity the author postulates a non-specific immunity connected with endothelial irritation by destruction products of parasites and red-cells, especially melanin and not dependant upon the presence of the parasite. To distinguish malaria immunity from the conception of premunition which is considered too narrow the term immunition is used a term which NICOLLE employed to describe "immunity following a natural infection. Serological reactions afford evidence of immunition and may measure it to a certain degree. The author is unable to agree, however that serological reactions are either strictly specific or capable of the aetiological separation of immunological phenomena which are probably multiple and certainly very complex. A IV

JOLLA (A) & DAXGLEMONT (F) Accès pernicieux palustres à *Plasmodium falciparum* avec évolution schizogonique complète du parasite dans le sang périphérique et hyperazotémie considérable transitoire [Pernicious Attacks of *falciparum* Malaria with Complete Schizogony Cycle of Development of Parasite in Peripheral Blood and Considerable Transitory Increase of Nitrogen Content of Blood.]—*Bull Soc Path. Exot.* 1939 Jan. 11 Vol. 32. No. 1 pp 50-58. With 3 figs.

This is an interesting report of two cases of pernicious *falciparum* malaria in Guadeloupe one of which was fatal. Both were extremely heavy infections in both all stages of the schizogonic cycle of development were found in the peripheral blood rosettes were numerous. The urea content of the blood was very markedly increased quite early in the attack. When the lack of organic resistance allows this development of schizogonic forms and extremely rapid multiplication of parasites the pernicious syndrome commonly results. The schizogonic forms of *P. falciparum* are extremely fragile there is an important destruction of parasites and red cells numerous rosette forms are seen free from their red cells or phagocytosed by macrophages blood cell and parasite debris is present in such abundance that the phagocytes though increased in number are unable to cope with it.

This abundance of debris is believed by the authors to play an important part in determining pernicious attacks by mobilizing macrophages which contribute to capillary embolism and by blocking the kidneys. This blocking of the kidneys results in anuria and uraemic symptoms. The resulting coma is both parasitic and toxic. The prognosis is dependant on the result of attempts to restore renal function

N II

SCHWETZ (J) *Considérations sur le paludisme congénital. [Congenital Malaria.]—Bull Soc Path Exot* 1939 Jan. 11 Vol. 32 No 1 pp 44-50

The author contributes no fresh observations on congenital malaria he refers to his own published findings and to numerous other reports that have appeared in malaria literature. He concludes that the numerous undoubted cases of congenital malaria reported were incidents in acute malaria that is to say that the mother had suffered from febrile attacks during pregnancy or actually during or little before confinement in nearly all these cases *P. vivax* was responsible for the infection. On the other hand the investigation of congenital malaria among populations suffering from endemic afebrile malaria has consistently given negative results and this in spite of the fact that numerous *P. falciparum* parasites were sometimes found in the maternal blood and also in the placenta. The explanation of this difference is unknown perhaps it is due to the greater friability and permeability of the placenta caused by febrile malaria. The harmful effect on the infant of malaria parasites in the placenta, reported by BLACKLOCK and GORDON 1925 has not been noted by other authors [see this *Bulletin* 1928 Vol. 23 p 130]

N II

GARDNER (William A) & DEXTER (Lewis) *A Case of Quartan Malaria following Transfusion and treated with Sulfanilamide—Jl Amer Med Assoc.* 1938 Dec. 31 Vol. 111 No 27 pp 2473-2475 [13 refs.]

A woman aged 30 who had never had malaria nor lived in a malarious locality was operated on a cold abscess was excised. To combat post-operative weakness she was given two transfusions of 600 cc of whole blood. A month after the first transfusion she had the first of a series of severe rigors the temperature rising to 103° to 105°F. The chills occurred at regular intervals of three days. She was re-admitted to hospital ring forms and gametocytes of *P. malariae* were found in the blood. The donor of the first transfusion had had quartan malaria seventeen years previously while serving with the Italian Army in Albania. He then returned to the U.S.A. since when he has made trips to Washington and Baltimore but never farther south. He has had no attacks of fever during these seventeen years no parasites were found in his blood. In spite of this the authors believe that the transfusion was responsible for the malaria infection. There was no other possible ascertainable source of infection.

The patient was treated with sulphanilamide 3.6 gm. a day for 17 days. No toxic symptoms were observed. Chills ceased parasites disappeared and the spleen decreased in size. The authors consider that the drug should be further tried in a large series of cases of malaria

N W

TSCHILOW (Konstantin) Malarischer Infantismus. [Malarial Infantismus.]—*Wien Klin Woch.* 1939 Feb. 24 Vol. 52 No. 8. pp. 183-185

A case of a 20 year old girl with a small thyroid, appearances of myxoedema, defective mentality undeveloped genitals, complete absence of secondary sexual characters considerable enlargement of liver and spleen with intermittent haemolytic crises. After 8 months of observation and treatment with quinine and hormones menstruation developed for the first time, as well as secondary sexual characters there was also a considerable increase in weight and height. The author considers that it can be confidently asserted that this case was one of paramalarial hepato-splenomegaly although he found no malarial parasites in the blood yet the fact that the patient came from a well known malarial district and gave a history of a past malarial infection, as well as the blood picture supported the diagnosis of malaria. Further under quinine treatment the size of the liver and spleen diminished.

E D W Grog

ROGER (Henri) & BODDORRESQUES (Jacques) La polyneurite paléoténne. [Malarial Polyneuritis.]—*Marseille Méd* 1939 Nov 5-15 Vol. 75. No 31-32 pp 493-522. [54 refs.]

A lengthy and very complete dissertation on the association of malaria with polyneuritis and a critical discussion of very numerous cases reported in the literature of the subject. That genuine malarial polyneuritis is a rare condition is shown by the fact that among the very numerous patients from malarial countries that have been seen in the Neurological Clinic of Marseilles during 15 years only one case of polyneuritis was observed in which the authors were satisfied as to the aetiological rôle of malaria. This case is described at length.

A W

PRUDHOMME (R. O) Nouvelle méthode de dosage de la quinine. [New Method for the Detection and Estimation of Quinine.]—*Bull Soc Path Exot* 1938. Dec 14 Vol. 31 No. 10. pp 829-832

The test is based on the property possessed by quinine and several other alkaloids of forming with certain acid dyes such as eosin, coloured combinations insoluble in water but soluble in chloroform. The pH of the medium in which the reaction is determined is of great importance. The colouration of the chloroform is at its maximum between pH 6.5 and 7.8. At a given pH the tint of the chloroform is proportional to the amount of quinine present. Standard colorimetric preparations are made with varying quantities of quinine sulphate quantities which would vary according as to whether urine, blood or organs were to be examined. The author describes the technique for the examination of the urine. It is necessary to clarify the urine for which purpose a reagent must be used that does not precipitate the quinine. The author uses a 10 per cent. solution of neutral acetate of lead. The excess of lead is eliminated by the addition of sulphuric acid.

In a test tube place 10 cc. of the urine add 5 cc. of the acetate of lead solution filter to 12 cc. of the filtrate add 5 drops of sulphuric acid in a concentration of 65°B * shake and filter several times through the same paper until a perfectly clear liquid is obtained to 9 cc of the liquid add a drop of litmus solution neutralize with caustic soda 36°B * till a lilac colour is obtained 2 cc. of a phosphate solution brings the pH to 7 four drops of an eosin solution are added the tube is shaken and 3 cc of chloroform are introduced the tube is once more vigorously shaken The colour of the chloroform is compared with that in the standard tubes, containing known quantities of quinine which are prepared in exactly similar manner

N IV

MALACHEVA (A N) Evaluation comparée de l'efficacité des deux méthodes de traitement de cas aigus de tierce bénigne dans les conditions du nord. [Comparison of Two Methods of treating Acute Cases of Benign Tertian Malaria in the North]—*Med Parasit & Parasitic Dis* Moscow 1938, Vol. 7 No 5 [In Russian pp 646-653 French summary pp 653-654]

Both methods of treatment involved the use of acridine In the first method 0.15 gm twice a day was given for 7 days in the second the same doses were given for 5 days then 10 days interval then the same medication for 3 days followed by a second interval of 10 days, after which the 3 days treatment was repeated—11 days treatment in all spread over a month There were 168 patients treated by the first method 141 by the second Two-thirds of the cases were infections of the previous year that is cases of prolonged incubation or of relapses. The frequency of early relapses in the two groups was almost identical 33.6 and 35.5 per cent but the interval between the initial attack and the early relapse was greater in patients who had been submitted to the longer course Repeated relapses were hardly ever experienced in the prolonged treatment group (only 2 cases) whereas in the 7-day treatment group 13 had 2, and 4 had 3 relapses.

N IV

TEICHLER (Günther) Ueber Atebrinkurzbehandlung bei schwarzen Pflanzungsarbeitern [Short Course of Atebrin Treatment for Plantation Coolies.]—*Arch f Schiffs- u Trop Hyg* 1939 Mar Vol. 43 No 3 pp. 125-127

The observations were made on a large sisal plantation in the interior from Tanga East Africa. The author treated prophylactically 500 natives in this highly malarial district with atebrin on 3 days (1 tablet of 0.1 gm thrice daily) He inspected in the next week all those who had atebrin and he found that 10 complained of fever 4 of headache 1 of giddiness and 1 of weakness, so there was a very small percentage reporting sick He considers that by giving such short courses of atebrin he can maintain the health of the labour force working in highly malarial districts It is not to be regarded as a means of systematically eradicating malaria.

E D IV Greig

(* The terms 65°B and 36°B. refer to the Beaumé density scale. H_2SO_4 at 65°B represents 89 gm concentrated H_2SO_4 diluted with 11 gm water NaOH at 36 B. represents 30 gm solid NaOH added to 70 gm. water)

CHOPRA (R. N.) & BASU (B. C.) Studies on the Effect of Anti Malarial Drugs upon the Infectivity of Patients to Mosquitoes. Part II. "Cilonal. — *Jl Malaria Inst of India*. 1938. Dec. Vol. 1 No 4 pp 351-352.

Three *P. falciparum* gametocyte carriers were the subjects of experiment. Large numbers of *A. stephensi* were fed on them before and after treatment with cilonal. A five day treatment consisting of cilonal 0.02 gm with atebain 0.1 gm. three times a day did not prevent the development of the parasites in mosquitoes. A postscript to the paper states that two further cases were treated with cilonal 0.03 gm three times a day for five days. Crescents had not disappeared on the fourth day but the patients were not infective for *A. stephensi*.

N IV

HEMK (IV) & MOHR (IV) Zur Frage der Wirksamkeit des Prontoils bei akuter Malaria. [Activity of Prontoil in Acute Malaria.]—*Arch f Schiffsa- u. Trop Hyg* 1939 Mar Vol. 43 No 3 pp. 117-125 With 4 figs. [11 refs.]

The authors refer to the work of DIAZ DE LEÓN, VAN DER WIELEN and HILL and GOODWIN on this subject. They studied the action of prontoil rubrum and prontoil soluble in 10 cases of malaria. 3 of benign and 7 of malignant tertian infections. the former preparation is given orally and the latter by injection. The results with both drugs in the treatment of malaria were unsatisfactory and they did not confirm the more satisfactory results obtained by DIAZ DE LEÓN and GOODWIN and HILL. The explanation of the difference lay either in a difference in the malaria parasite strains or in the immunity of the patient. the authors consider the latter the most probable explanation. However the results should not interfere with further research on the action of sulphonamide bodies in malaria and possibly they might be found to have an action on the cycle of the malarial parasite in the reticulo-endothelial cells.

E D IV Grog

FARINAUD (E) & RAGIOT (Ch) Recherches sur l'emploi des dérivés de la sulfamide dans le traitement du paludisme. [Sulphamide Derivatives in the Treatment of Malaria.]—*Bull Soc Path Exot* 1938 Dec. 14 Vol 31 No 10 pp 907-910

Three malaria patients infected with *P. falciparum vivax* and *malariae* respectively were treated with intravenous injections of soluseptasine, 10 cc morning and evening for 10 days. Regular counts of parasites were made throughout the treatment. In the *falciparum* case schizonts had completely disappeared on the 6th day but gametocytes increased in number and were very numerous on the 10th day. In the *vivax* case there were 2,200 schizonts and 49 gametocytes at the beginning of treatment. the blood was clear of parasites on the 5th day. In the *malariae* case treatment appeared to diminish the number of schizonts which were however still numerous at the end of treatment. the drug had no demonstrable effect on *malariae* gametocytes. All three were mild cases. The author concludes that the schizonticidal action of soluseptasine justifies the inclusion of that drug in the list of anti malaria remedies.

N IV

VAN RIEL (J) Essai de traitement de la malaria par le cuprochin [Experimental Treatment of Malaria with Cuprochin.]—*Ann Soc Belge de Méd Trop* 1933. June 30 Vol 18 No 2 pp 339-342.

Cuprochin was formerly known as Paludex and several reports have been published concerning its value as an antimalaria remedy [this *Bulletin* 1937 Vol 34 p 596 597] now Paludex consists of one part quinine and two parts cuprochin. Cuprochin is cupro- δ -xyquinoline sodium disulphonate. The author treated 14 adults suffering from *falciparum* malaria of average severity with cuprochin. Each patient had a twenty day course of treatment one gram a day for patients weighing from 41 to 50 kgm the dose being increased for those of greater weight. Parasites persisted throughout the treatment in six cases gametocytes appeared during treatment. From the clinical point of view the drug was equally ineffective. Four children were also treated with no better results they all lost weight and the malaria persisted. N IV

SERRA (G) L'utilité de la splénocontraction dans le paludisme chronique avec splénomégalie [Value of Splenocontraction in Treatment of Chronic Malaria with Enlarged Spleen.]—*Ann Soc Belge de Méd Trop* 1933 Sept 30 Vol 18 No 3 pp 501-507 [24 refs.]

With experience of some twenty recently treated cases the author writes enthusiastically of the value of Ascoli's method of treatment which he regards as a most important addition to malaria therapy. He confirms the favourable results obtained by many other workers. N IV

RUSSELL (Paul F) Malaria due to Defective and Untidy Irrigation. A Preliminary Discussion.—*Jl Malaria Inst of India* 1939. Dec Vol 1 No. 4 pp 339-349 With 22 figs. on 11 plates [22 refs.]

Interesting quotations from reports some of which are nearly a hundred years old show with what persistence the association of irrigation with malaria has been stressed by public health workers. In spite of this the author's observations have led him to believe that the situation as regards malaria and irrigation is probably worse to-day than ever before irrigation malaria not only persists but is being made a greater problem each year.

During the last 80 years the Government of India has spent a hundred million pounds on irrigation projects crops raised on land thus irrigated are now worth some 66 million pounds a year. India has been a leader in fundamental research in irrigation and in every aspect of malariology. There has been almost complete failure to integrate in practice these two subjects.

It is not irrigation but defective irrigation that produces malaria. The author has been engaged on the study of this problem in a part of the Tanjore District in the south of the Madras Presidency [see this *Bulletin* 1939 Vol. 36 p 131]. He has on his staff an entomologist a physician trained as a malarialogist an agronomist investigating the relationship between farming irrigation and malaria, and an engineer

with experience of irrigation and agricultural engineering. Attention is called to the following malaria producing defects in construction, operation and maintenance of an irrigation system, all of which are well illustrated by photographs—defective sluice gates seeping canal banks borrow pits defective distributing chambers excessive supply of water frequently seen in canals improper delivery of water into a roadway or ditch for example improper maintained canal banks and canal beds absence of any planned or controlled system of field channels insufficient number of bridges across canals perhaps the most important defect cutting off drainage canals perhaps the most important defect absence of water caused by a barrage and general untidiness. In the district under study, a dry tank has become a wet one during the irrigation season, rice is now cultivated fallow fields remain wet for a longer time than formerly rivers and tanks carry more water and are empty for a shorter time the subsoil water has risen wells which formerly contained water to a level of 35-40 feet below ground now have an average water level of less than 10 feet and in some seasons less than a foot below ground level unplanned streams and channels have become numerous ditches are full of water as are borrow pits, throughout the irrigation season. Engineers cannot be held responsible for all these undesirable products of an irrigation system. Detailed specific corrective or preventive technique for dealing with irrigation malaria will be considered in future publications. In the meantime the author urges the need for organization and co-operation of the many agencies interested, especially for more active and more practical co-operation between malariologists and irrigation engineers.

A 17

SCHAEFF (J W) Some Methods of Malaria Control.—Jl. Malaya Branch Brit Med Assoc 1938 Dec Vol 2 No. 3. pp 165-168.

AFANASSIEV (S F) The Employment of the Distillate of Coke Filters for the Destruction of the Larvae of *Anopheles maculipennis* Preliminary Communication.—Med Parasit & Parasitic Dis Moscow 1938. Vol 7 No 5 [In Russian pp 694-700]

The object of the experiments recorded in this paper was to test the efficacy of a cheaper substitute for petroleum in combating anopheline larvae. The author employed the distillate of coke filters obtained in the final stages of fractional distillation of Russian petroleum. The distillate is composed of heavy oils (including solar oil) and represents a mixture of various hydrocarbons, mainly aromatic compounds.

In a laboratory experiment the distillate sprayed over the surface of the water in a vessel containing 60 larvae of *A. maculipennis* killed all of them in one hour. When applied to natural reservoirs containing mosquito larvae the distillate caused the destruction of all the larvae and of other aquatic animals, except crustaceans and Gambusia, in 24 hours. It is concluded that the distillate provides a satisfactory substitute for petroleum and can be used for oiling in the same doses (from 25 to 50 grams per square metre, according to the amount of vegetation present).

C 4 Hours.

ROY (D N) On the Control of Malaria-Mosquitoes in Bengal by the Use of Predacious Fish and on the Habits of Two of them.—*Jl Malaria Inst of India* 1933 Dec. Vol 1 No 4 pp 405-416 [11 refs.]

Observations on the habits of two small fish common in Bengal are recorded —*Panchax panchax* and *Barbus phutunio*. The first named is the most useful of the indigenous species in antilarval work. The author concludes however that the rôle it plays is of very limited value. *A. philippinensis* and *A. varuna* are the two tank breeding vectors against the larvae of which the fish would be expected to be most effective. During the malaria transmission season the tanks in Bengal are heavily overgrown with vegetation the presence of which affords protection for the larvae against the depredations of fish

N IV

ENQUIRIES

Requests for information are constantly being received by the Bureau of Hygiene and Tropical Diseases. As the replies to some of these may be useful to others as well as the individual enquirer it has been decided to publish selected answers from time to time.

Request — I should be grateful for any reference in the literature which you may be able to give me to the viability of helminthic ova in sewage after tank treatment

Reply

- 1 McVAIL (J B) Preliminary Note on Septic Tank Latrines in Relation to Hookworm Disease.—*Indian Jl Med Res* 1922. Apr. Vol. 4 pp 806-808
[See *Trop Dis Bull Sanit Suppl* 1922. June 30 p 126]
- 2 KHALIL (M) The Relation of Sewage Disposal to the Spread of Helminth Infections in British Guiana.—*Jl Helminthology* 1924 Vol 2, Nos 4 & 5 pp 175-180
[See *Trop Dis Bull* 1925 Vol. 22. p 455]
- 3 KHALIL (M) The Pail Closet as an Efficient Means of controlling Human Helminth Infection as observed in Tura Prison, Egypt, with a Discussion on the Source of Ascaris Infection.—*Annals of Trop Med & Parasit* 1931 Vol. 25 pp 35-62.
[See *Trop Dis Bull* 1931 Vol. 23 p 665]
- 4 HIRST (L. F) Hookworm Disease and Ceylon Sewage Works.—*Ceylon Jl of Science* Sect. D Med Science. 1932. Vol. 2. No. 5 pp 245-275
Abstract taken from *Biol. Abst.* 1933 No 18832.

A remarkable outbreak of dermatitis occurred in May 1919 among a gang of 11 coolies digging trenches in which sludge from septic tanks had been buried at least 3 years before. While no explanation is available for this initial outbreak, the author's studies here on sludge and effluents from central sewage treatment works and in controlled experiments contain numerous observations of interest in this field. Ova closely resembling *Necator americanus* have been found in the silt of the main sewers and

snaps of the pumping station the highest count being 250 eggs per gm. of sludge (DCE). Hookworm larvae were only occasionally detected in the main drainage system, though larvae of free-living nematodes were common. Sludge from the two-story septic tanks of the main treatment works yielded a mean count of 23 hookworm ova per gm. (infective larvae were cultured from this sludge) as well as many *Ascaris* and *Trichuris* ova. The highest count of hookworm eggs obtained from sewage entering these tanks was 330 per litre though typical hookworm larvae were seldom detected here. It is very roughly estimated that 1/3 of the hookworm ova passed by the population of Colombo City reach the septic tanks of the sewage treatment works in a recognizable condition. In an experimental sewage treatment plant the rate of elimination of hookworm eggs from avian sewage (2-100 minutes) was studied in the effluent of 3 double-story Imhoff pattern tanks in series. A characteristic test showed that passage through the first of 3 similar tanks reduced the hookworm ova in a representative 24-hour sample of sewage to 1-9% of the original count of 15,500 per litre. The effluent from the second tank showed a further reduction to 0-8% the third tank to 0-4. About 30 hookworm eggs per litre were present in the final effluent after passage through 3 tanks in series and a rubble bed during a flow through period of 41 hrs. *Ascaris* and *Trichuris* eggs were also very much reduced, although the quantitative test applied is not to be considered as accurate. The rate of elimination of hookworm eggs at each stage of the treatment was correlated with that of the suspended solids. Attempts to accelerate the death rate of ova in drying sludge through the use of de Smet's boxes (entrapping solar heat), were promising. Suggestions are made for the design and operation of sludge pans with a view to combining the functions of drying and heating to the best advantage.

[See also Trop Dis Bull 1932 Vol 29 p 757.]

- 5 VASANIKOVA (Z.) Sur la déhelminthisation des eaux d'épuration par méthodes intensives.—*Medical Parasitology & Parasitic Diseases* 1938 Vol 5 No 5 pp 657-673 [In Russian.]
Abstract taken from Dept Secret & Indust Res Water Pollution Research Summary (Current Literature 1938 Nov No 1529)

Sewage and sludge from the biological purification plant of Tula, and from the aeration plant of Kopezhkov (Alo-cow) were examined for helminth ova. Over 2,000 ova belonging to 5 species were found per litre of crude sewage. The Imhoff tanks removed 97 per cent of these ova, and the secondary sedimentation tanks 87 per cent of the remainder. Biological filters only reduced the numbers by 18-28 per cent. Chlorination did not affect the vitality of the ova. The sludge contained up to 468 ova per gm. 20 per cent of these were destroyed by anaerobic digestion. In sludge kept in the open the ova did not disappear completely for 3 years. To obtain better removal of the ova the author advises longer periods of settling filtration through sand, and an increase in the temperature of the digestion tanks to 45°C.

- [See also Trop Dis Bull 1937 Vol 34 p 784.]
VASKOVSKAYA (S. M.) The Degree of Dehelminthization of Sewage at Kharkov Bio-Station.—*Medical Parasitology & Parasitic Diseases* 1938 Vol 7 No 3 pp 450-454 [In Russian.]
Abstract taken from *Hilological Abstracts* Vol 7 Pt. 4 No 3925

Vaskovskaya reports on the helminth eggs (*Ascaris*, *Trichuris*, *Hymenolepis* and *Taenia*) recovered from Kharkov sewage at various stages in its treatment and disposal which here involves anaerobic and digestion and aeration of the liquid in sprinkling filters. The concentration of eggs falls from 68 per litre in the crude sewage to 2 per litre in the effluent. Eggs were present in all the sludges, in scum from the meth-

tank, and in the zoogloccal film from the filters. Even in sludge fields of 4 years standing *Ascaris* eggs were present at a depth of 1 metre in a concentration of 7 per g

- 7 RUDOLPH (Willem) Hookworm in Sludge—*Engineering News Rec*
1937 Nov 4 Vol 119 No 19 p 762
[See *Trop Dis Bull* 1938 Vol. 35 p 672]

REVIEWS AND NOTICES

SCOTT (H Harold) [CMG MD FRCPLond DPH DTM & H
Camb FRSE Director Bureau of Hygiene & Tropical
Diseases etc] *A History of Tropical Medicine Based on the
Fitzpatrick Lectures Delivered before the Royal College of Physicians
of London, 1937-38* Vol. 1 pp vii+1-648 Vol. 2 pp ix+
649-1165 With 13 plates 1939 London Edward Arnold &
Co [Two Vols. 50s]

This great work is based on the Fitzpatrick Lectures which the author delivered before the Royal College of Physicians in 1937-38. A careful perusal of the preface will enable the reader to form some conception of the task which Scott has undertaken. Here we read

With regard to choice of subject in my case fortunately there was no difficulty the difficulty is in the fulfilment. Here and there scattered in medical works dealing with diseases in the tropics we find a few notes on the history of these diseases but speaking in any sense other than the narrowest there is no history of the rise and development of tropical medicine and yet the subject is of absorbing interest. It is a most fascinating occupation to study the early vague empirical ideas as to the causation of a disease to trace the beginnings of rational thought thereon the interpenetration of scientific notions and empiricism the progressive clarification of the haze of doubt to the final solution of the problem.

In the case of so-called Tropical Medicine the difficulty has been the greater because it has necessitated tracing back in some instances to times of savagery the earliest available records and to legends prior to record. In others the first traces had to be sought in articles in books in references in foreign languages works attainable with much difficulty and often only in garbled or mutilated copies the originals of which had been lost.

Another and very real difficulty with which the author was confronted is that we have no definition of the term Tropical Medicine. He shows that if we accept its narrow interpretation as diseases restricted to the tropics we could with close approximation to the truth say that it is non-existent. If the interpretation be extended to diseases met with in warm climates we have to include nearly all the ills that flesh is heir to and almost equal difficulties are encountered if it be decided to deal with *prevailing diseases* in warm climates. The task which the author has set himself is not to give a history of diseases of warm climates but a history of tropical medicine

in the generally accepted sense the former would have necessitated going over ground already well covered—a discussion of malaria, plague and perhaps other diseases from the dawn of history—but the latter is the rise and development of tropical medicine. Its starting point is the time when reason began to throw its light upon and illumine the darkness of empiricism, when people began to theorize regarding causation of disease to consider the problems scientifically and that rarely takes us back more than a hundred to a hundred and fifty years. The author has, however frequently found it necessary to select times long antecedent to this, because some of the modern idea on aetiology, pathogeny and treatment originated in ancient empiricism and their history would be incomplete if such were disregarded.

The general plan which Scott has left before him in writing this History is as follows.—As a preliminary he describes from the medical point of view the state of some of the countries when they first came under European rule and by this means indicates the nature of the problems which arose and the conditions under which their solutions had to be undertaken. He then traces how improvements have been brought about usually starting with the health of the natives, be officials and traders, and subsequently with that of the natives, he shows how local preventive measures have expanded to include public health on a wider scale how philanthropy has made an ever increasing claim on the governing race, and finally how the welfare of the native has come to take first place.

Such is the task which Scott has set himself and how well he has accomplished it the reader must judge for himself as it is quite impossible for a reviewer to give more than a bird's-eye view of the contents of these two large volumes.

The first two chapters deal with the progress of hygiene in the East and Mercantile Marine from the early days when commerce with all and the lot of the sailor quite a secondary consideration, and with the conditions under which the soldier lived during the eighteenth and nineteenth centuries. Chapter 3 depicts the conditions of the people and the prevailing diseases of a century or a half ago tropical and subtropical colonies to which they were liable in the and Chapter 4 deals similarly with India and Australasia. These four chapters, which are copiously illustrated by most interesting and pertinent quotations, make fascinating reading.

Chapters 5 to 18 are concerned with great diseases of the tropics, viz.—malaria, blackwater fever, yellow fever, trypanosomiasis, leishmaniasis, leprosy, cholera, plague, undulant fever, relapsing fever, melioidosis, dengue, amoebiasis, ankylostomiasis, and the tropical diseases connected with food. It may at first sight seem that of all the worm diseases ankylostomiasis alone finds a more formidable list. But Scott tells us that it is the only one of sufficient interest to call for any detail. world of course be presumptuous for any reviewer to express opinion whether these chapters give an adequate and accurate out of the history of all the great diseases with which they deal, doubtless there are individuals who have made a historical study one or two of them, but it would require the united efforts of many such experts to produce a critical review of any value of volumes covering such an immense field.

But although the present reviewer must freely admit that he has no expert knowledge of the history of any of the important tropical diseases the fact that he has, since the first appearance of this *Bulletin* been responsible for the summaries of blackwater fever and sleeping sickness papers entitles him to claim some acquaintance with the literature of these diseases. It was consequently with special interest that he examined the chapters devoted to them and he was well repaid. Something was learned much that was half forgotten was recalled to mind and wherever statements and data were tested they were found to be accurate.

Next follow three delightful chapters devoted to the Suez Canal the Panama Canal and the slave trade and disease and finally there is a chapter consisting of brief sketches of the lives of a few of the more important or better known of those who have devoted their chief interests to tropical medicine viz Bontius Bruce Carroll Cruz Dutton Findlay Garcia da Orta Gorgas Lazear Leishman Lind Manson Noguchi Reed and Ross. As is shown by the names selected for this special notice and by the list of authors consulted which is given at the end of the volumes Scott has not failed to give due credit to workers of all nations.

The reviewer finds it quite beyond his powers to do justice within the compass of a short review to this monumental work which is truly remarkable not only for its wide learning but equally for its general interest and the delightful manner in which its stories are told. It is doubtful whether anyone but the Director of the Bureau of Hygiene and Tropical Diseases could have written such a book and it is certain that everyone who acquires these two volumes will read them with pleasure and with profit.

W. Yorke

AMSTERDAM. *Acta Conventus Tertii de Tropicis Atque Malariae Morbis. Pars I. Acta Conventus Tertii de Tropicis Morbis.* 720 pp. III. *Pars II. Acta Conventus Tertii de Malariae Morbis* [Transactions of the Third International Congress on Malaria and Tropical Diseases]—601 pp. III. 1938. Amsterdam Societas Neerlandica Medicinae Tropicae.

Neither of these volumes can be reviewed in the accepted sense of the term. Each contains matter of great scientific value and should be kept for reference as denoting the state of knowledge towards the end of 1938 of the many subjects dealt with.

Previous Congresses in Tropical Medicine had been held in 1913 and 1928 and the third was arranged for 1932 but had to be postponed. Malaria Congresses had been held in Rome in 1925 in Algiers in 1930 and a third was to take place in Madrid in 1935 but it too had to be postponed owing to the unrest in Spain. The two Congresses were, therefore held simultaneously in Amsterdam in September 1938 under historical conditions of great political unrest and in fact were nearly brought to naught after the first two days on that account.

These two volumes record the papers read—more than a hundred in all—and the discussions which arose out of them. Some sixty in Volume I deal with tropical conditions the chief of which are deficiency diseases filariasis, plague and yellow fever and forty two in Volume II with various aspects of malaria its epidemiology parasitology treatment and control in different countries.

Professor C. D. DE LANGE undertook the task of editing all these for publication together with giving an account of the introductory and concluding ceremonies and addresses—a task which must have entailed much misnomers and real hard work, but which has been accomplished in a way which could not have been surpassed. To him, therefore are due the very hearty congratulations and thanks of all those who attended the Congresses and who have thereby become recipients of these excellent volumes of reports.

H H S

PETROV (V. P.) *Kala Azar (Visceral Leishmaniasis)* Thesis for M.D. Medical Institute Tashkent 260 pp. With 71 figs. [880 refs.]
In Russian pp 1-258. English summary pp. 259-263.]

This publication, representing the author's thesis for M.D. is actually intended to be a text or handbook on kala azar. In illustrating various aspects of the disease the author has drawn largely upon his own clinical experience (857 cases) a course which will probably be appreciated by Russian physicians practising in the affected areas of U.S.S.R. Since some of the data relating to the country are scattered in various publications and are sometime inaccessible they will be briefly summarized here for the benefit of those not conversant with the Russian language. The first chapters are devoted to the history and distribution of kala azar in the Soviet Union this disease occurs east and west of the Caspian sea in Transcaucasia (Armenia, Georgia and Azerbaïdjan) where 300 cases have been recorded, and in Middle Asia (Tashkent, Kerki, Samarkand, Katta-Kurgan, Bahmansabz, Bokhara, Tcharcho-Kerki, Ashkhabad, and in the Kushka, Takhta-Bazar, Kashka-Daria, Serkhan-Daria and Andijan districts) with about 2,000 cases. Oriental sore and canine leishmaniasis occur in the same regions sometimes in separate foci, sometimes overlapping the areas of distribution of kala azar. (The distribution of leishmaniasis in U.S.S.R. is illustrated by a map.) Chapters 3 and 4 deal with the aetiology and transmission of kala azar. The most important vector in Middle Asia is *Phlebotomus papatasi* in addition to which the following fifteen species have been recorded in U.S.S.R. *P. argenti* *P. var. alexandri* *P. caucasicus* *P. squamipennis* *P. major* *P. chinensis* *P. subarcticus* *P. venosus* *P. perillatus* *P. pautouvi* *P. kandelaki* *P. borovskii* *P. griseus* *P. segniensis* *P. minor*. In chapters 5 and 6 an account is given of the epidemiology and clinical course of kala azar. Like some other Russian workers the author believes that canine and human visceral leishmaniasis are intimately connected. In Middle Asia the seasonal incidence of kala azar coincides with the winter and spring months. The disease is more common in children under 6 years (about 80 per cent.) The age-distribution is thus similar to the highest (58.8 per cent.) The next chapter (7) deals with the methods of diagnosis. For direct examination the author strongly recommends gland and smears punctures, in preference to spleen puncture as regards serological methods he has obtained consistently good results with complement fixation, while the various biochemical reactions were found to be unreliable. The last three chapters (8, 9, 10) are devoted to pathology, therapy and prophylaxis. There is an extensive bibliography including 219 Russian references. The handbook will be of real value to Russian practitioners in the endemic

regions while the foreign reader will find in it useful local data some of which have been briefly mentioned above. The author is not to be blamed for the external appearance of the book, the poor quality of the paper and the defective reproduction of some of the illustrations.

C A Hoare

MEIJER (Trans Hendrik) *Onderzoek van vibriosen uit Nederlandsch Indië en den Hedjaz*. [Examination of Vibrios from Netherlands India and the Hedjaz] [Thesis for Doctorate of Medicine at Amsterdam University]—155 pp With 1 plate [9 pages of refs] English summary 1939 N V Uitg Mij C A J van Dishoeck Bussum

The title of this thesis does not fully indicate the scope of the monograph which is very largely devoted to a critical examination of the El Tor vibrio question. That question forms at the present time one to which it is very desirable that a satisfactory answer should be given and it is the endeavour of the author to prove that the El Tor produces a different disease from the cholera vibrio. He has considered and included a great deal of the work of others in his thesis while his own work is skilfully interwoven with the text of the several chapters. These chapters comprise—Introduction. Technical methods. Vibrios isolated in Batavia. Strains isolated at Mecca. Recognition of the cholera vibrio. Diseases caused by vibrios other than the cholera vibrio. Summary and conclusion. The summary and conclusion which is in French and English as well as in Dutch represents a great deal of the author's own opinions and work. A long and very useful bibliography completes the thesis.

In Batavia 20 444 samples of faeces were examined and these were divided into one group of 14 854 sound persons that is to say with no abdominal condition and a group of 5 590 patients. A further group was constituted by samples of surface and well waters. The healthy group provided 54 vibrios and the patient group 46 vibrios. Not a single typical agglutinable El Tor vibrio was found. The vibrios isolated from the patient group in contrast to the healthy individual group and the water group was very homogeneous. All the strains of the group gave a positive cholera red reaction liquefied gelatin in 1 to 3 days showed haemolysis in blood broth usually in one day and for the greater part did not ferment mannose and arabinose.

Of the vibrios isolated in Mecca 14 were from water and 11 from faeces. One of these M 28 was a typical El Tor vibrio belonging to group I of GARDNER and VENKATRAMAN. It came from the well known Zam Zam well. All the other Mecca strains gave much the same reaction as the Batavia patient group.

Haemolytic power is one of the chief features by which the El Tor and most of the water vibrios may be distinguished from the true cholera vibrio. It has again been shown that this property remains constant. If blood be added to bouillon cultures of haemolytic vibrios those which have been incubated for 24 hours only at 37°C show haemolysis but with the increase of the incubation say to 5 days the addition of blood is no longer followed by haemolysis. One explanation of this is that haemolysin (exohaemolysin) is destroyed by the digestive ferment possessed by vibrios. Even the true cholera vibrio is haemodigestive when freshly isolated. Haemodigestion therefore has to be taken into account in determining haemolytic effect of an

El Tor vibrio and even of water vibrios. This difficulty can be got over by using blood bouillon instead of solid media for test, because in this case digestion does not take place. DR MOOR found that haemodigestion only took place in the presence of oxygen and devised the method of incubating blood agar plates *in vacuo* to get rid of the disturbing effect of digestive action. Thus he did in determining the character of what is now called *V. cholerae*. Still another method of separating the two properties of haemolysis and haemodigestion is that of VAN LOGHEM, who found that all vibrios having digestive power lose it slowly with continued subculture. van Loghem also explains the so-called late haemolysis of the cholera vibrio as due to an endohaemolysin not an exohaemolysin and accounts for its appearance by the liberation of endotoxin with the death of vibrios. Its appearance can be delayed by delaying the death of the vibrios. In his own work the author confirms what is called the phenomenon of CHAPEX who claims to have discovered a serological difference between *V. El Tor* and *V. cholerae*. A suspension of the former heated for 3 hours at 56°C. still remains agglutinable, whilst the latter becomes magglutinable. A similar result is obtainable by treating suspensions with chloroform. "Finally the toxicity in regard to the white rat is a point of difference between the two vibrios. Intracutaneous injection of cholera vibrios produces little or no effect but necrosis and inflammation follow the injection of El Tor and water vibrios.

It is still a matter of uncertainty how far the El Tor vibrio is to be reckoned with as a producer of disease. Such disease as it may produce seems to be quite independent of cholera. This leads the author to maintain "that enteritis choleraiformis El Tor is not the same disease as cholera and consequently the international regulations laid down for cholera are not applicable to the El Tor disease." W. F. Hervey

BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN.

Vol. 36]

1939

[No 10

SUMMARY OF RECENT ABSTRACTS

VIII TYPHUS GROUP OF FEVERS *

[It has not been found possible to adopt a satisfactory method of classification for the work here summarized. General information and work on vaccination have therefore been collected into a separate section followed by sections on (1) the group predominantly positive to *Proteus* O\19 (vectors louse and flea) (2) that positive to O\K (vector mite) and finally (3) the indeterminate group (vector tick). These sections, however cannot be rigidly separated.]

General

The classification of the typhus group of fevers is not yet satisfactorily settled. BURNET (p 356) suggests a provisional classification of the Rickettsial diseases which though depending largely upon the vectors is not rigidly confined to that method. This scheme is not based upon serological reactions. He points out that in true typhus man is principally involved, whereas in other typhus-like fevers man is only occasionally involved.

OCHI (p 792) describes a method for staining Rickettsia in sections which cannot be further abstracted

Vaccination

PARROT (p 368) differentiates between true immunity in which as in scarlet fever the organism disappears completely from the body but immunity remains and premunition in which there is protection so long as living organisms remain as in syphilis. In the latter the reticulo-endothelial system is involved. The proof of the existence of premunition is detection of the parasite in the resistant body. This is difficult in rickettsial diseases but may be accomplished (1) by inoculation of blood into susceptible animals (2) by the feeding of vectors on animals, or (3) by splenectomy or reticulo-endothelial blockage followed by relapses. By these methods certain rickettsial diseases have been shown to produce premunition and by analogy it is suggested that certain diseases of the typhus group may do the same. Since therefore the presence of living organisms is necessary for protection

The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1938 Vol. 35. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

in diseases giving rise to premunition, vaccines for typhus must be prepared with living virus. In non-epidemic periods, it is possible that some interference with the reticulo-endothelial system in persons in whom the virus is latent may result in parantic relapse with infection of lice, thus forming a starting point for an epidemic outbreak.

For the culture of typhus *Rickettsia* ZIKSSER *et al* (p. 363) used 4 per cent agar with equal volume of double strength Tyrode solution to which 50 per cent horse serum had been added. Growth appeared on the slope in 6 days. Later (p. 784) they employed a modified agar medium (q.v.) with mouse embryo tissue for the culture of *Rickettsia*. These cultures can be used for the preparation of vaccines. BENGTSON (p. 373) prefers Baker's solution to Tyrode's solution in Maitland's medium for the cultivation of the *Rickettsia* of Rocky Mountain fever [*R. rickettsii*]. She subcultured successfully for 14 generations and 81 per cent of animals inoculated from time to time reacted to the virus. There was no loss of virulence. The *Rickettsia* were seen in the cytoplasm, but not in the nuclei, of the cells. Similar success was obtained (p. 363) with the viruses of endemic and epidemic typhus. BARYKIN *et al* (p. 784) inject infective material into the yolk of eggs near the embryo and incubate at 32°C. Large amounts of virus are obtained.

In the *Bulletin of the Health Organisation* (League of Nations) (p. 357) are set down the findings of a Committee engaged on the consideration of vaccination against typhus. Living vaccines confer earlier and greater protection than killed vaccines and should be used in the presence of an epidemic. In a country free from the disease however it is wiser to avoid the introduction of living virus and killed vaccines should therefore be used if prophylaxis is considered necessary. Standard methods of licensing should be organized and carried out vigorously.

A considerable fall in the mortality rate of Rocky Mountain fever in the north western United States in recent years is attributed by HAMPTON and EURANK (p. 800) to the extensive use of vaccine.

In experiments on guinea-pigs NOURY (p. 370) found that killed vaccine gave no protection against typhus.

In Tunisia LAIGRET *et al* (p. 784) used a living vaccine of endemic typhus virus dried and suspended in egg yolk and finally in olive oil. In 30 000 persons vaccinated in 1936 in areas where typhus existed, only 3 cases occurred in that year and none in 1937 though cases were found in the non-vaccinated. The three measures taken were isolation, leaving of contacts and vaccination, the advantage of the latter being that normal life can be continued. SCHÄFER (p. 370) obtained good protection in mice with 2 doses of living virus emulsified in egg yolk and in oil. Dried vaccine similarly emulsified was not nearly so effective.

The Weigl killed vaccine prepared from lice was used near Lwow and RADLO (p. 783) states that about 80 lice intestines are prepared for each person, given in 2 or 3 doses. To check an epidemic it is enough to vaccinate 30 per cent of the population.

BLANC and BALTAZARD (p. 384) found that faeces of fleas infected with murine virus, carefully dried *in vacuo* may be infective for 100 days. Four volunteers were immunized by a vaccine of such faeces treated with bile. GAUD (p. 793) shows that after an extensive campaign of vaccination against typhus by the method of Blanc the number of cases of typhus which had assumed epidemic proportions,

in N. Africa was greatly reduced. No severe reactions were seen. BONJEAN and NAIN (p 368) found positive Weil-Felix reactions in 96 of 111 persons recently vaccinated against typhus with bile-treated vaccine.

CASTANEDA (p 369) found that the phenomenon previously observed by ZINSSER and himself that irradiation of infected rats produced large numbers of rickettsial bodies in the peritoneal fluid from which vaccines could be prepared does not occur if the rats are kept at over 38°C.

BENGTSON (p 374) prepared a vaccine to which was added formalin in the proportion of 0.1 per cent from cultures in modified Maitland's medium. This proved effective in guinea-pigs.

KLIGLER and LEVINE (p 795) use two-week-old tissue cultures of typhus *Rickettsia* triturated and suspended in saline and formalized for vaccination. Monkeys and laboratory workers developed positive Weil-Felix reactions after vaccination without discomfort or rise of temperature.

Proteus O119 type Vectors louse and flea

Having previously isolated *Proteus* V19 from the blood of 50 per cent of patients in a small outbreak of typhus SPARROW and ROUSSEL (p 367) repeated the attempt and succeeded in only 2.8 per cent of 309 Weil-Felix positive bloods. They also isolated the same organism from 6 per cent of 100 bloods from patients with fevers other than typhus.

GIROUD and TANNENBAUM (pp 368 and 792) show that *Proteus* though common in the intestine of man and rabbits is not found in guinea-pigs and that the latter do not give positive Weil-Felix reactions on infection with typhus but do so if *Proteus* has previously been introduced into the alimentary canal. They suggest that the Weil-Felix reaction is due to the passage of *Proteus* into the blood during an attack of fever.

Although mice may be easily infected by large intraperitoneal doses of the virus of endemic typhus OKAMOTO (p 370) found that with the same technique only 2 of 412 mice showed *Rickettsia* when the virus of epidemic typhus was used.

By inoculating dilutions of emulsions of organs of animals infected with typhus into the skin of rabbits GIROUD (p 791) showed that the tunica which gives a nodule in dilutions up to 1/2000 contains 10 times more virus than other organs. Cultured virus gave less marked reactions than passage virus.

BALTAZARD (p 795) quotes the work of NICOLLE to show that typhus virus mixed with immune serum does not infect and shows that when treated with bile the viruses of murine typhus and boutonneuse fever fail to provoke local reactions. In researches on sera from persons with Rocky Mountain fever and typhus conducted with murine and boutonneuse viruses he has found that the serum of persons or animals cured of typhus or murine typhus prevents local reaction by murine virus and that serum from boutonneuse and Rocky Mountain fever prevents local reaction by boutonneuse virus. GIROUD (p 790-791) shows that serum from patients recently recovered from typhus mixed with the virus for 30 minutes prevents reaction on injection into the skin of the rabbit. Normal serum does not. This test may be used to demonstrate antibodies in the blood. On the other hand he shows (p 791) that serum from persons who have received inoculations

of killed virus not only does not prevent reaction when mixed with living virus and injected, but also leads to a more severe reaction than is found with normal serum. WEIGL (p 785) however states that the serum of convalescents if mixed with virus can prevent infection in animals. The serum of recently vaccinated persons is equally effective and if given together with vaccine during the incubation period of typhus, fever is prevented and immunity due to the vaccine is developed. Contacts may be protected in the same way.

GEAR and BECKER (p 787) describe in detail the course of a case of typhus accidentally acquired in a laboratory. The incubation period was one week, the rash appeared on the 5th day of fever, there was a crisis on the 13th day, leucopenia was present and the Weil-Felix reaction was positive to *Proteus OX19* only. There was no true primary sore as in tick bite fever.

WU and ZIA (p 785) conclude that there are two types of *Rickettsia* in Peiping, one resembling the endemic type and giving scrotal swellings in guinea-pigs, the other resembling the epidemic type with which these swellings do not occur but which regularly produces typhus nodules in the brains. Complete cross immunity was found between the former and the Mexican strain, but not between the epidemic type and the Mexican strain. DELBOVE and NGUYEN VAN HUONG (p 364) showed that two strains isolated from rats in Saigon produced fever and (in half the tests) scrotal reactions in guinea-pigs. By cross immunity tests it was found that 3 strains were immunologically identical with the Peking strain of epidemic typhus. Between 8 and 9 per cent of the sera of 1 015 rats gave positive Weil-Felix reactions, mostly with *Proteus OX19* but some with OXA. The percentage rose to 20 in June and fell to 6 in April and May.

Of 50,000 patients in Peiping in recent years, 450 were diagnosed as suffering from typhus and in a high proportion the serum agglutinated *Proteus OX19* in a dilution of 1,280. Typhus nodules in the brains of 10 studied by CHUNG and CHANG (p 783) were numerous. One case is reported in detail. The Weil-Felix reaction was positive for *Proteus OX19* 1 in 1,280. Guinea-pigs inoculated with blood developed fever but no orchitis, body lice injected into guinea-pigs produced fever, clean lice fed on the patient were heavily infected with *Rickettsia* and produced fever in guinea-pigs, and *Rickettsia* were found within the cells of lice intrarectally infected with guinea-pig brain emulsion. These findings point to true epidemic typhus.

RAYNAL (p 781) shows that louse-borne relapsing fever is common in Shanghai and reports 14 cases of typhus with positive reaction to *Proteus OX19*. These are also probably louse-borne.

DRPOMLAV (p 781) describes the measures taken against typhus in Czechoslovakia. APPEL (p 799) points out procedures whereby notification, disinfection and isolation can be more effectively carried out than at present in the department of Constantine. These cannot be further abstracted. CHI and SU (p. 799) describe a simple hot air delousing box in which lice and mites can be killed in 20 minutes.

GRAY *et al* (p. 788) describe the first case of sporadic typhus in Bristol for 10 years. Serum agglutinated *Proteus OX19* but not OXK. No virus could be isolated from rats captured near the man's work place, a mill. In the *Irish Journal of Medical Science* (p 306) is a record of a man diagnosed as suffering from typhus in Cork city. The Weil-Felix reaction was negative on 3 occasions but clinical evidence

was convincing Typhus has not been recorded for 8 years but may exist in the rat population still

LE CHUITON *et al* (p 782) on the assumption that the virus of murine typhus was present on bread contaminated with the urine of rats in Toulon harbour and that outbreaks among members of the crews were due to this fact caused the bread which had previously been left exposed on the tween decks to be carefully stored and found that the numbers of cases of the disease fell from 34 in 1935 to only 4 in 1937 [see VIOLE below]

MODINOS (p 360) describes a case of murine typhus in Egypt in which agglutination of *Proteus* X19 was present and blood produced fever and orchitis in a guineapig. An animal previously inoculated with a known typhus virus was found to be immune to blood from this patient. Cases of true typhus and boutonneuse fever are also described. Near Tunis DURAND (p 360) discovered a patient with murine typhus. The virus produced fever and orchitis in guineapigs and there was cross immunity between this virus and that of true typhus and that of murine typhus but not with the virus of boutonneuse fever. Agglutination of *Proteus* OX19 took place at 1 in 16 000 dilution.

DURIEUX and ARQUIÉ (p 361) show that murine typhus may be a fatal disease and record one death in 4 cases occurring in Dakar. *Proteus* OX19 was agglutinated at 1 in 500 dilution and fever and orchitis produced in guineapigs.

Two cases giving positive reactions with *Proteus* X19 are recorded by MONTRESTRUC *et al* (p 362) from Martinique. A single case of typhus in which *Proteus* OX19 and OX12 were agglutinated is reported by GOSDEN (p 381) from Trinidad. No others have been reported for many years.

HSEIH *et al* (p 362) report 14 cases of typhus from Changsha. All recovered and were probably of the murine type.

In the *Public Health Notes* Adelaide (p 363) it is stated that endemic typhus in South Australia is the same as that found elsewhere but it has not yet been possible to isolate the virus.

GOURIOU *et al* (p 789) report phlebitis of the leg in a patient with endemic typhus. This has not been recorded before though it occurs in boutonneuse fever.

With the virus of murine typhus GIROUD (p 796) found that in mice rats guineapigs and rabbits general susceptibility is inversely proportional to local reaction. This may be shown in tabular form —

	General susceptibility	Local reaction
Mice	High fever	Nil
Rats	Fever not so high	Nil
Guineapigs	Mild fever	Definite
Rabbits	Not apparent	Marked

KASAHARA *et al* (p 784) filtered tissue cultures and emulsions of organs from guineapigs infected with murine typhus through Berkefeld filters and demonstrated Rickettsia in smears from the tunica of guineapigs inoculated with material from rabbits which had received injections of the filtrate.

BLANC and BALTAZARD (p. 785) found that the minimum infective dose of murine typhus virus in louse faeces was at least 100 times greater for the guineapig than for man.

RIDING (p. 360) has isolated a virus obtained from the brains of 4 wild rats caught near Cairo. Fever and orchitis were produced in guineapigs and infected rabbits developed positive Weil-Felix reactions. ZWIERS (p. 786) found that 16 per cent. of the sera of rats from endemic typhus areas in Poland gave positive Weil-Felix reactions. The virus gave fever but no orchitis in guineapigs.

In the southern United States, BRIGHAM and DYER (p. 782) have found opossums, field mice, rats and the flying squirrel to be susceptible to the virus of endemic typhus. They isolated it from one field mouse.

VIOLLE (p. 786) shows that young pigs can be infected by ingestion of the virus of murine typhus and of boutonneuse fever the latter producing a rash and (p. 371) records the infection of a young pig with the virus of endemic typhus, with the development of a macular rash which became petechial. VIOLLE and SAUTET (p. 786) failed to transmit murine typhus to rats by the bite of *Triatoma infestans* but succeeded when the bugs were crushed and ingested by the rats. VIOLLE (p. 372) infected a dog by feeding with the brain of a guineapig infected with murine typhus. The Weil-Felix reaction was negative but the blood of the dog was infective. He suggests that infection may be conveyed to man by food contaminated with the urine of rats [see LE CHURTON *et al.* above]. He considers that the wild rabbit may be a reservoir of this virus. Intradermal injection of small doses of virus into rats and guineapigs is useful in rapid diagnosis.

Noting that guineapigs receiving the virus of Tunisian murine typhus by instillation on to the conjunctiva acquire immunity though no severe infection results, SPARROW and MARESCAL (p. 794) applied the same technique to 5 men. All developed mild fever without rash, in 15 days the Weil-Felix reaction became positive and all were proved to be immune.

Proteus OAK type Vector mite

Twenty cases of scrub typhus mostly positive to *Proteus OAK* and negative to *OAK 19* are reported from plantations in Cambodia by DELBOVE *et al.* (p. 780). All occurred in male coolies engaged in clearing scrub and in the rainy season when the rodent population was driven by floods to the high ground where the men were working. ALAIN and DELBOVE (p. 781) record 4 cases of fever which they regard as closely allied to Japanese river fever observed in Indo-China. Three gave positive reactions with *Proteus OAK* all showed primary sores and generalized maculo-papular rash. Guineapigs inoculated from one developed fever but no scrotal reaction.

KAPILA and MAITRA (p. 358) describe a patient in India with severe fever, enlarged glands and a rash. The Weil-Felix reaction for *Proteus OAK* was positive on the 15th day.

SHORTT (p. 779) reports that 68 of 134 squirrels in Madras gave positive Weil-Felix reactions with *Proteus OAK* from 1/25 to 1/200 dilution. No positive results were obtained from the examination of ectoparasites or from 90 bandicoots.

VAUCEL and BRUXEAU (p. 383) cultivated 22 strains of *Proteus* from the blood of 288 rats in Hanoi. Only one was fully identified as *Proteus OAK*.

KAWAMURA *et al* (p. 374) have used the virus of the mild form of tsutsugamushi fever seen in the Pescadores for fever therapy in the treatment of nervous diseases. Symptoms produced were slight and 8 days later inoculation of the potent Japanese virus resulted in a mild reaction only. There was slight improvement in the mental condition.

RAGIOT *et al* (p. 788) note that although there are two clinical types of typhus in Indo-China, one with rash and primary sore and one without, the viruses of the two types are apparently identical, resembling those of Rocky Mountain and São Paulo fever and producing agglutinins to *Proteus* OXA but not OX19. Guinea-pigs inoculated with the virus of scrub typhus isolated in Saigon by DELBOVE and NGUYEN VAN HUONG (p. 785) showed results resembling those produced by Rocky Mountain fever rather than by tsutsugamushi fever and were not rendered immune to the Peking typhus virus.

In the Simla hills there occur two waves of typhus. One in winter in which sera agglutinate *Proteus* OX19 and one in August-October in which sera agglutinate *Proteus* OXA. SMITH and MEHTA (p. 358) investigated the serological reactions of 1212 wild rats caught from May to February and found a marked increase in OXA agglutinins from October to December. No result was obtained in attempts to infect guinea-pigs from two rats which showed high reactions to OXA by means of mites, fleas, ticks or injections of emulsified brain and spleen tissue. Ticks and mites failed to transmit the OX19 virus but fleas (*N. simla*) fed on the same infected animals and injected into guinea-pigs produced orchitis and in rabbits agglutinins for OX19. Virus of the OXA type was isolated from fleas on rats during the time when the OXA type of fever was common but no OXA virus was recovered.

MEHTA (p. 358) found that in the Simla hills the flea population of rodents was lowest in the cold weather when the maximum number of murine typhus cases (OX19) occurs but fleas, lice and ticks are at a maximum in August to October when OXA cases occur. He suggests that larval mites and *Hyalomma* may transmit the rural (OXA) type.

YALON (p. 359) describes an outbreak of typhus-like fever with primary necrotic sore, enlarged glands and definite rash in the Punjab. The Weil-Felix reaction for *Proteus* OX19 was positive in 6 of 7 patients tested, but in low dilutions only.

HASSETT (p. 359) records a severe case in India, with symptoms of meningitis in which agglutinins for *Proteus* OX19 and OX2 were found in 1 in 1000 dilution.

Indeterminate type Vector tick

CUMMING (p. 779) shows that cases of typhus in the United States varied from 300 in 1931 to 1662 in 1936 and that increasing numbers are being reported from rural areas with new reservoirs found in mice, rats, marmots and squirrels.

CAREY and DUNCAN (p. 801) describe a case of Rocky Mountain fever in eastern U.S.A. There was high fever, a macular rash and agglutination of *Proteus* OX19. In the *Health News* New York (p. 801) it is reported that 4 further cases of Rocky Mountain fever have occurred in Long Island, all giving reactions to *Proteus* OX19.

An outbreak of spotted fever in Columbia is reported by PATINO *et al* (p. 361). Of 63 persons attacked 60 died. Blood from 7 patients produced fever in guinea-pigs and *Rickettsia* were found in cells in the peritoneal fluid and similar results were obtained by injecting emulsified

head lice from the patients though those from normal persons produced no reaction. Weil-Felix reactions with Proteus OX19 OX2 and OXK were all negative. In view of the evident house infection the authors suggest that a tick of the genus *Ornithodoros* may have been the vector.

PARKER (p. 800) shows that *D. variabilis* is the vector of Rocky Mountain fever in eastern U.S.A. and *D. andersoni* in the north western states. A mild type of the virus may be found in *H. leporis palustris* the common rabbit tick which does not bite man.

In Brazil, DIAS (p. 801) shows that though the dog is the principal reservoir host of spotted fever (including Rocky Mountain São Paulo and Minas Geraes types) the opossum and wild rabbit are also affected. The commonest tick vectors are *Amblyomma cajennense* and *A. striatum* and *R. sanguineus* may accidentally infect man as it is a common vector in dogs. TRAVASSOS (p. 365) believes that the opossum *Didelphis aurita* is a reservoir of São Paulo typhus. He succeeded in infecting several and found "typhus nodules" in the blood vessels of various organs though the animals were not ill. The virus could be passaged through the animals in series and was found in several opossums caught near São Paulo. The virus is transmissible by *Amblyomma cajennense* and in rabbits produces agglutinins for Proteus OX19. He (p. 797) obtained evidence of the transmission of the São Paulo virus in guinea pigs by various stages of *Amblyomma striatum*. He also (p. 798) found that these ticks collected from dogs were naturally infected and could transmit the disease by bite. *A. brasiliense* is also capable of transmitting the virus.

Rickettsia rickettsii has a characteristic morphology and multiplies in the cytoplasm of smooth muscle cells and of blood-vessel walls. It proliferates in the nuclei of cells in mammalian tissue culture. Non-pathogenic *Rickettsia* are found in ticks and PINKERTON and HASS (p. 372) investigating the differentiation found that the latter are not seen within the cell nuclei, nor are they pathogenic. They conclude from a large series of examinations that morphological appearances are not diagnostic and that the only unequivocal differentiation is the intranuclear occurrence of *R. rickettsii*. The non-pathogenic organisms are common in certain cells of the salivary glands of the ticks but do not produce massive invasion of the tissues generally as is the case with *R. rickettsii*.

TRAVASSOS (p. 786) maintains the virus of São Paulo typhus in white rats by injecting 1 or 2 cc. of normal guinea pig blood intra peritoneally 3 or 4 days after the rat is infected. He (p. 797) shows that the virus of São Paulo typhus multiplies in white rats though no lesions are found. The rats are strongly resistant to the virus and reduce its virulence on passage.

Although horses were apparently infected with living Mexican typhus virus, CASTANEDA and VARGAS-CURIEL (p. 797) failed to obtain a potent antiserum from them. They propose to super-immunize horses by intensive intravenous injections of formalized *Rickettsia*.

BLANC and BALTAZARD (p. 371) failed to infect a series of guinea pigs, monkeys and men, who had previously been inoculated with or had suffered from boutonneuse fever or had received living bile-treated vaccine with either the homologous virus or that of Rocky Mountain fever.

VIOLLE (p 789) shows that the viruses of boutonneuse fever and ship typhus cannot always be separated even by cross immunity tests and that the effects of inoculation in rabbits are similar. By ingestion pups can be infected with the endemic typhus virus and rats with the boutonneuse fever virus.

NOURI (p 364) has preserved the virus of boutonneuse fever by the inoculation of an emulsion of the swollen tunica suprarenal glands and spleen intraperitoneally into guineapigs repeating the subinoculations every 5 days. Reactions have remained uniform for more than one year with orchitis on the 3rd or 4th day and a rise of temperature immediately following this. Recovered guineapigs are immune to the virus of Rocky Mountain fever. The virus can also be preserved for some months by placing dead infected guineapigs in the ice chest.

LOGOTHETIS *et al* (p 790) show that virus from a patient with boutonneuse fever heated to 56°C for 30 minutes produced no reaction in the patient on intradermal injection but provoked a reaction in a normal person when mixed with the patient's serum. An emulsion of infected guineapig brain produced no results in animals but with normal serum gave a reaction. Ticks from the patient's house were infective.

Although blocking of the reticulo-endothelial system by colloids results in increase of severity of subsequently induced epidemic typhus in guineapigs NOURI (p 798) found that with endemic typhus and boutonneuse fever it resulted in unapparent infection with subsequent immunity.

OLMER and OLMER (p 788) record a case of boutonneuse fever occurring in Marseilles in winter which is unusual.

The development of a primary sore on the eyelid with involvement of the corresponding glands in a woman who in crushing a tick from a cat received a splash in her eye is recorded by AUBARET (p 367). A rash typical of boutonneuse fever developed.

BLANC *et al* (p 780) report two cases of typical boutonneuse fever contracted in West Africa from a tick infested dog brought from Marseilles.

In Senegal PELTIER *et al* (p 780) report a patient whose symptoms were those of boutonneuse fever with the exception that there was no *tache noire* and whose serum agglutinated *Proteus* OX19 1/500 and OX2 1/2000. (The reactions of two endemic typhus patients on the other hand were OX19 1/50 000 and OX2 1/200). Animals inoculated developed slight fever without orchitis and a pet dog belonging to the patient was infested with *Rhipicephalus* and had never been away from Senegal.

GERMAIN and MORVAN (p 782) report from Lorient a fever of the typhus group with rash and serum positive to *Proteus* OX2 and OY19 but without primary sore. Hitherto no case of boutonneuse fever has been reported from the Atlantic coast of France.

RAYBAUD (p 367) has observed that a *tache noire* typical of boutonneuse fever may occur with fever but without rash. He (p 789) reports a case of boutonneuse fever without rash but with primary sore.

GEAR and DOUTHWAITE (p 787) isolated a strain of tick typhus from a dog tick *Haemaphysalis leachi* in South Africa and conclude that this tick is the vector of that disease.

C Wilcocks

MALARIA.

PRECIS OF ABSTRACTS IN THIS SECTION

BOYD (p 808) reviews the present state of malaria prevention and control and concludes that for success control should not be a campaign but a long term programme utilizing measures of the highest degree of permanence.

SWEET (p 808) describes the three types of irrigation systems in Mysore State in relation to malaria. Minor irrigation from local tanks where water is scarce and therefore carefully conserved causes little malaria, large irrigation projects from greater tanks which seldom or never go dry are frequently malarious, while extensive river irrigation covering a large acreage with a perennial water supply is invariably highly malarious.

SCHWETZ (p 808) reports the finding of *P. ovale* and of schizonts of *P. falciparum* in native children suffering from afebrile endemic malaria in Central Africa, and SHIEBER (p. 809) the finding of *P. ovale* in a patient in Palestine.

GIGLIOLI (p 809) writing of malaria on the Coast Land of British Guiana, states that *A. darlingi* (not previously recognized there) is the main carrier of malaria in the Colony.

BOYD and MATTHEWS (p 809) report that, following natural inoculation with massive doses of sporozoites of *P. falciparum* parasites were first detectable microscopically in the blood of a negro patient on the 10th day and that in a series of individuals subinoculated daily with blood from this first patient, the seventh individual of the series was the first in whom parasites could be detected and in him the parasites were not found until the 8th day following subinoculation.

TOUMANOFF (p 810) discusses the possibility of malaria of buffaloes falsifying the oocyst and sporozoite indices of Anopheles in Indo-China.

SHUTE and LUGREANI (p 810) have investigated the longevity of races of *A. macdougalli* and from their observations are led to believe that the average *atroparvus* remains infective longer than the average *macdougalli*.

KITCHEN (p 811) examined the mature and immature erythrocytes in *P. falciparum* and *P. malariae* infections and found that *falciparum* appears to be indifferent to the age of the erythrocytes it invades, while *malariae* favours mature erythrocytes.

BOYD and KITCHEN (p 811) have examined the skin and subcutaneous tissue at the sites of infected mosquito bites. Their findings do not suggest that the lymph passages are the normal route by which the majority of sporozoites reach their destination.

MANCEAUX (p 812) has studied the leucocyte formula of acute malaria patients and notes that the changes in it are remarkably constant.

CRESTA (p 813) records his observations on 21 patients suffering from malaria with special reference to suprarenal function, and summarizes the literature on the subject. PIZZILLO (p. 813) reports on a patient in whom reactivation of malaria with pernicious symptoms was observed during intravenous adrenalin treatment. MARASOV (p. 814) discusses the literature of cases with symptoms of Addison's disease in which malaria appeared to be the aetiological factor.

PROSKE and WATSON (p 813) subscribing to the view that Henry's reaction is brought about by an increase in serum euglobulin have

therefore devised a protein-tyrosin reaction for the quantitative estimation of euglobulin as a diagnostic test for malaria

DURAND (p 814) reporting on the treatment with various sulphonamide derivatives of 36 patients suffering from either *vivax* or *falciparum* malaria concludes that the action of these drugs is not regularly effective enough for them to replace quinine or the usual antimalaria synthetic products though their antimalaria activity warrants further research on these lines COGGESHALL (p 824) has studied the therapeutic effect of sulphanilamide on *P knowlesi* infections in *rhesus* monkeys and concludes that this drug completely eradicates infection in the cases treated and that subsequent reinoculation reveals the existence of a residual immunity which may last for three months

LATASTE *et al* (p 815 816) describe a method for estimating quinacrine (the French equivalent of atebirin) in the blood. They have used this method to ascertain the repartition of quinacrine between red cells and plasma and the relationship between the blood concentration and urinary excretion of quinacrine

KIKUTH (p 816) discusses the chemotherapy of malaria on the basis of recent knowledge of the parasites

MOLLARET and SCHNEIDER (p 817) have studied the action of rhodoprequine on the schizonts of *P vivax*

DECOURT (p 818) discusses the principle on which antiplasmodial measures should be based.

CANET (p 818) elaborates the general conclusions drawn from a 4-years experience of mass prophylactic administration of quinacrine on the rubber plantations in the red-soil belt of Northern Cochinchina.

CLARK and KOMP (p 819) report on the 8th year's observations on malaria in Panama with the object of evolving a method of malaria control applicable to a native population of tropical America where antimosquito measures cannot be used.

HACKETT *et al* (p 820) write on the nature applicability and limitations of naturalistic measures of anopheline control the purpose of their report being to systematize existing knowledge.

MULLIGAN and AFRIDI (p 821) record the general principles which should be observed to obviate the creation of malarious conditions during engineering constructional works in India. JANDOLO (p 821) deals with bonification in respect of malaria in Italy

EATON (p 821) shows that a soluble malaria antigen occurs in the serum of monkeys with acute *P knowlesi* infection. This antigen when injected into normal monkeys gives rise to complement fixation antibodies similar to those produced by malaria infection but no protective or agglutinating antibodies are formed.

TUPA and CRUCA (p 822) have studied the histopathological lesions in experimental *P knowlesi* infections in *M rhesus* and conclude that this infection is associated with a hypertrophy of the reticulo-endothelial system in those organs where infective red corpuscles come into contact with the histiocytes

AFRIDI (p 823) has made observations on the extra-abdominal spleen (i.e. the spleen transplanted to the surface of the *pectoralis abdominalis* muscle and left lying between this and the skin) in monkeys infected with *P cynomolgi* and *P knowlesi*. In *cynomolgi* infection the chief enlargement of the spleen occurred after the parasites had reached their peak, while in *knowlesi* infection the maximum enlargement occurred before the height of the infection.

CIRCA *et al* (p. S23) have studied the mechanism of immunity acquired in intentional infections of general paralytics with *P. knowlesi*. It would seem that after recovery from the *P. knowlesi* infection there is a definite immunity independent of a premunition.

R. L. S

BOVD (Mark F) Malaria Retrospect and Prospect.—*Amer J Trop Med* 1939 Jan. Vol. 19 No. 1 pp. 1-6.

This is a presidential address. It is a brief review of the present state of malaria prevention and control. Except in the field of epidemiology the application of the discoveries of LAFERAN and ROSS has not yielded results commensurate with the importance of these discoveries or the importance of malaria. The reasons for this are discussed. "Malaria control should not be a campaign, it should be a long term program.

With the means at present available we will more economically utilize our resources, more quickly achieve our goal, and more firmly hold our position by the employment of the practices with the highest degree of permanency. We should build out malaria."

Norman White

SWEET (W. C.) Irrigation and Malaria.—Reprinted from *Proc. Nat Inst Sciences of India*. 1939. Vol. 4 No. 2 pp. 185-189

There are three types of irrigation in Mysore. Minor irrigation of small acreage from tanks the water supply being dependent on rainfall, is associated with little or no malaria. Water is scarce and treated with respect. Larger irrigation projects from large tanks which never go dry and which distribute water through a system of canals are frequently associated with malaria of some severity. Extensive river irrigations with perennial water supply distributed by large canals and many miles of subsidiary channels are invariably responsible for much malaria. Spleen indexes of children of areas representative of these three types of irrigation are produced. Figures are also produced illustrating the increased mortality following the inauguration of river water irrigation following the construction of the Cauvery Dam and the Irwin Canal. Water was as usual supplied in excess and no provision was made for drainage.

A. H.

SCHWEITZ (J.) Sur quelques parasites rares trouvés dans le paludisme endémique des noirs de l'Afrique Centrale. (*Plasmodium orals* et schizontes de *P. falciparum*.) [Rare Parasites found in Endemic Malaria of Natives of Central Africa.]—*Rev. de Malariologia* Ser. I 1938 Vol. 17 No. 6. pp. 431-437

The author reports the finding of *P. orals* in the blood of several native children in the Congo suffering from afebrile endemic malaria. The presence of schizonts of *P. falciparum* in the peripheral blood is generally associated with very acute cases. The author reports their presence in the blood of children in East and West Congo who were not suffering from fever and who though heavily parasitized, were apparently well.

A. H.

SHIEBER (Chaim) The Presence of *Plasmodium ovale* in Palestine.—*Harefuah* Jerusalem, 1939 Apr Vol. 16 No 4 (94) [In Hebrew pp 122-125 [11 refs.] English summary p II]

A mixed infection of *Pl vivax* and *Pl ovale* was found in a patient living near Haifa.

The *Pl ovale* was typical in every respect and showed all the characters mentioned by Stephens in his original description.

This is the first record of *Pl ovale* acquired in Palestine

GIGLIOLI (George) Malaria on the Coast-Land of British Guiana.—*Health Conditions on the British Guiana Sugar Estates* 1938 Nov 21 Appendix I and II pp. i-xxvi.

Three species of Anopheles are prevalent on the coast of British Guiana *tarsimaculatus albistarsis* and *darlingi*. Till recently the two latter species have been classified as a single species erroneously identified as *argyritarsis* which apparently is not found on the coast. Of 13 000 Anopheles captured in houses 88 per cent were *darlingi*, of 2 000 captured in stables only 2.6 per cent. were *darlingi*. Both *tarsimaculatus* and *albistarsis* are zoophilic whereas *darlingi* has a predilection for man. These and other considerations lead to the conclusion that *A. darlingi* is the only important vector. It breeds in bodies of water of considerable size the water must have a low saline content and a neutral or very slightly acid reaction. Its breeding places are protected by vegetation affording shelter for the adult and some shade for the larva. It is a strict night flier its dispersion and range of flight are favoured by high atmospheric humidity.

Between August and November 1937 5 814 children under 12 years of age were examined on 15 estates. Spleen rates from zero to 60 per cent were observed the parasite rates ranged from 13.5 to 68.7 per cent. There was epidemic prevalence of malaria when the survey was made. In the positive films unidentified large ring forms were found in 42.8 per cent *P. vivax* in 28.8 *P. falciparum* in 7.3 and *P. malariae* in 21.1 per cent.

Splenic enlargement is much more marked and persistent among East Indians than among negroes living under exactly similar conditions.

The incidence of malaria diminishes from west to east along the coast as does atmospheric humidity. The distribution of malaria and of *A. darlingi* are coextensive.

Epidemic conditions of 1937 and 1938 were in large part determined by excessive rainfall, which markedly increased breeding facilities for *A. darlingi* and provided the high atmospheric humidity favourable to this species.

N IV

BOYD (Mark F) & MATTHEWS (Choice B) An Observation on the Incubation Period of *Plasmodium falciparum*—*Amer J Trop Med* 1939 Jan. Vol. 19 No 1 pp 69-71

A male negro patient for whom malaria therapy had been prescribed had 30 anophelines applied to him 25 fed. Of these 25 sporozoites were found subsequently in the salivary gland of 21. Thereafter 10 cc. of his blood was inoculated daily into one of a series of other susceptible patients until the 10th day when parasites were found in the blood and a clinical attack commenced. The seventh individual

of the series was the first in whom parasites could be detected in hum parasites were found on the 8th day following subinoculation and fever commenced on the 9th day. Very similar results have previously been reported by the first named author in the case of *P. vivax* (see this *Bulletin* 1935 Vol. 32, p. 405) N IV

TOUMANOFF (C) Le paludisme des buffles peut-il fausser les indices oocystiques et sporozoïtiques en Indochine? (Can Malaria of Buffaloes falsify Oocyst and Sporozoite Indices in Indo-China?)—*Bull Soc Path. Exot.* 1939 Jan. 11 Vol. 32. No 1 pp 80-87 [11 refs.]

The author previously reported the persistence of malaria sporozoites in two *A. minimus* after the insects had fed several times on cattle [see this *Bulletin* 1938 Vol. 35 p. 569]. In referring to that report BRUMPT put forward the hypothesis that the malaria of buffaloes might conceivably falsify the oocyst and sporozoite indices of anopheline vectors in Indo-China. The present paper rebuts that hypothesis. *P. budalis* has never yet been found in Indo-China. The evolution of malaria parasites in the malaria vectors of Indo-China (*minimus jayponensis* and *hyrcanus*) is sometimes slower than is generally thought. It is consequently not very easy to determine the age of sporocysts from their morphological appearance. This tardy evolution is sometimes noted at high temperatures which are considered to be optimal. The persistence of sporozoites in the two cases reported was connected with active sporocystic evolution in insects heavily infected on several occasions. It is possible that the specially slow evolution may be related to the absorption of animal blood by the infected insect, but this remains to be proved. N IV

LEESON (H. S.) Keys to the Known Larvae and Adults of West African Anopheline Mosquitoes.—*Bull Entom Res* 1939 Apr Vol 30 Pt 1 pp 129-161 With 36 figs

SHUTE (P. G.) & UNGUREANU (E.) Preliminary Report on the Longevity of the Races of *Anopheles maculipennis*—League of Nations Health Organisation, Malaria Commission Geneva 1939 Feb. 21 C.H./Malaria/273 11 mimeographed pp

The authors study the proportion of mosquitoes (races of *A. maculipennis*) which survive under various experimental conditions and the proportion which might develop a salivary infection with *Plasmodium*

It has been repeatedly found that *A. maculipennis atroparvus* lives well in captivity and that about 80 per cent of a batch will survive long enough to show sporozoites in salivary glands. The races *typicus* and *mesicus* give a high mortality in captivity

In the simplest experiment here described twenty specimens of each of four races of *A. maculipennis* were kept at 24°C and a relative humidity of 70-80 per cent. On the 11th day (the day on which sporozoites of *P. vivax* appeared in glands of *atroparvus*) 19 *atroparvus*, 14 *labrarchiae*, 14 *typicus* and 10 *mesicus* were alive. Six other experiments were carried out, under varying conditions of temperature and humidity, all but one in summer in Rumania. The proportion of *atroparvus* living long enough to become infective was consistently 85-100 per cent, the proportion of other races surviving long enough

was much lower (only 32 per cent in *messeae*) but inconsistently so. The different races are not strictly comparable for all *atroparvus* were fertilized and laying eggs but the others were not fertilized (and had therefore presumably a lower metabolic rate).

In one experiment bred females of *atroparvus* and *messeae* were fed on the same human patient. The results were —

	<i>atroparvus</i>	<i>messeae</i>
Number of females fed	28	28
Positive sporozoites	22	17
Mean number of oocysts	61	15

The authors believe that the average *atroparvus* would have continued to be infective for a longer time than the average *messeae*.

P. A. Buxton

CRAWFORD (R.) Some Anopheline Pupae of Malaya with a Note on Pupal Structure.—110 pp With 27 figs. Published by the Govt of the Straits Settlements and the Malaria Advisory Board F.M.S. 1938. Singapore Govt Printer

KITCHEN (S. F.) The Infection of Mature and Immature Erythrocytes by *Plasmodium falciparum* and *Plasmodium malariae*.—*Amer J Trop Med* 1939 Jan Vol 19 No 1 pp 47-62 With 5 figs [10 refs]

The author has previously reported the marked partiality of *P. vivax* for reticulocytes [see this *Bulletin* 1939 Vol 36 p 138]. He now publishes the results of similar observations using the same technique of three patients suffering from typical clinical attacks of *falciparum* malaria and of two patients with *malariae* infections. All were cases of induced malaria, two of the *falciparum* cases being infected by anophelines, the other and the two *malariae* cases by blood inoculation. The results are clearly set out in tables and graphs. The total numbers of mature red cells infected with *P. falciparum* constantly exceeded the total numbers of reticulocytes so infected. The two types of cell alternated irregularly in showing the higher percentage of infection. The stage of the disease did not appear to influence these variations. The incidence of infection of reticulocytes with *P. malariae* was very low; this parasite was absolutely and relatively much more frequent in mature erythrocytes.

N. W.

BOYD (Mark F.) & KITCHEN (S. F.) The Demonstration of Sporozoites in Human Tissues.—*Amer J Trop Med* 1939 Jan Vol 19 No 1 pp 27-31 With 4 figs on 2 plates

The skin and subcutaneous tissue about the site where a single infective mosquito was applied was removed under local anaesthesia as soon as possible after the removal of the mosquito. The tissue was sectioned and searched for sporozoites. Three cases are reported. In no case did excision prevent infection. In one case two typical unchanged sporozoites were seen in one section about 3 mm. from the

surface of the skin they were extravascular and surrounded with extravasated blood.

In four other cases the site of mosquito inoculation was the inguinal region one or two of the larger adjacent lymph nodes were excised the day following the application of the mosquitoes. Sections of the glands were examined. In one case several sporozoites were observed, all in connective tissue none in lymphoid tissue. In no case did the removal of glands have any effect on the subsequent infection. The appearance of the sporozoites found in lymph nodes was unaltered indicating that they had neither reached their destination nor achieved their destiny. The finding does not suggest that the lymph passages are the route by which the majority of sporozoites travel to their destination.

V II

PARROT (L.) CATANZI (A.) AMBIALET (R.) & CLASTRIER (J.)
Observations parasitologiques sur le paludisme en Algérie (Roufi novembre 1934-mai 1935) [Parasitological Observations on Malaria in Roufi, Algeria.]—*Arch Inst Pasteur d'Algérie* 1935. Dec. Vol. 16 No. 4 pp. 459-495 With 6 diagrams

This is a fuller account of work already reported and abstracted in this Bulletin 1939 Vol. 30 p. 388

V II

MASCEAUX (A.) La formule leucocytaire dans le paludisme aigu. [Leucocyte Formula in Acute Malaria.]—*Bull Soc Path Exot* 1939 Feb. 8. Vol. 32 No. 2 pp. 150-151.

The author has made a study of the leucocyte formula of a large number of patients suffering from acute malaria. Changes in it are remarkably constant and correspond to the reaction of the organism to the infection. During the five days following the application of infected anophelines there is an increase of monocytes with the appearance of Turk cells and Rider cells. During the attack there is an initial leucocytosis, with increase of neutrophilic cells and mononuclears; this diminishes during the attack and is replaced by mononuclear increase alone after the attack. After several days, or several attacks, the initial moderate leucocytosis is sometimes replaced by slight leucopenia. polynuclear neutrophils diminish commonly to 40 to 50 per cent. polynuclear eosinophils commonly disappear. monocytes oscillate round 10 per cent. and lymphocytes frequently amount to 40 to 50 per cent. With recovery the formula gradually returns to normal, but monocytosis may persist. This persistence indicates a still active reticulo-endothelial system. A return of the formula to normal is a good test of clinical recovery.

These changes in the leucocyte formula follow the fluctuations of the serological index (melano-flocculation). Blood cholesterol falls and rises with the number of polynuclear cells. The bilirubin in the blood is increased, the increase tending to disappear when symptoms disappear but increased blood bilirubin like excess monocytes and for similar reasons may persist. The return to normal level of bilirubin and monocytes is evidence of complete cure.

A II

CHESSA (Fausto) La funzionalità surrenale nella malaria. [Function of the Suprarenals in Malaria]—*Riv di Malarologia* Sez. I 1938. Vol. 17 No. 6 pp 439-455 [48 refs] French summary (5 lines)

An interesting summary of the literature of the subject is followed by notes of 21 patients suffering from malaria, both acute and chronic including both *vivax* and *falciparum* infections with special reference to suprarenal function. They each received an intravenous injection of insulin. Eight cases exhibited a hypersensitivity to insulin i.e. cases in which the fall in glycaemia following the injection exceeded 0.30 mgm. the glycaemia remaining below the pre-injection level for two hours. N II

PROSKE (H. O.) & WATSON (Robert B.) The Protein Tyrosin Reaction. A Biochemical Diagnostic Test for Malaria—*Public Health Rep* 1939 Feb 3 Vol. 54 No. 5 pp 158-172. [40 refs.]

This paper opens with a survey of the literature of Henry's Reaction. The authors subscribe to the generally accepted opinion that that reaction is due to a disequilibrium of the serum proteins characterized by an increase of the euglobulin fraction which flocculates upon dilution with distilled water or with weak salt solutions. If this be so the quantitative chemical estimation of the euglobulins should give results similar to those of Henry's Reaction. A method has been devised for such an estimation. This is described in detail.

A 14 per cent. solution of anhydrous sodium sulphate in distilled water is used to precipitate the euglobulins. Euglobulin like other proteins has chromogenic properties in the presence of a phenol reagent. The colour produced by the euglobulin in the sample is compared with that produced by standard solution of pure tyrosin (Pfanstuehl). The phenol reagent used is that of Folin and Ciocalteu. All glassware should be chemically clean. The serum pipettes should have fine tips and the serum should be clear.

As a result of the examination of over 2,000 normal blood sera, the authors have found that the tyrosin index for euglobulin fluctuates between 50 and 80. For serum of malaria patients the index ranges from 80 to 280 or higher. The test was found to be indicative of malaria in 97.4 per cent. of known malaria cases compared with 81.9 per cent. positive thick blood films examined at the same time. The test is of course no more specific than is Henry's Reaction but it is very sensitive in malaria. The test is moreover relatively simple and needs no expensive apparatus such as a photometer. N II

PIZZILLO (Giuseppe) Sulla cura adrenalinica venosa nelle infezioni malariche. Nota XIII—Sindrome pernicioza da riattivazione [Reactivation of Malaria, with Pernicious Symptoms, during Intravenous Adrenalin Treatment.]—*Riv di Malarologia* Sez. I 1938 Vol. 17 No. 6 pp 456-461. With 1 chart. German summary (3 lines)

A man aged 30 suffered from an acute attack of *falciparum* malaria in Italian East Africa. He was repatriated and suffered from a relapse during the voyage home. He was admitted to hospital again suffering from fever a month after his arrival in Italy. He was kept four days under observation without treatment. He had quotidian fever.

there were numerous *falciparum* parasites in his blood. On the 5th day adrenalin treatment was begun the initial dose being 1/50 mgm., associated with quinine by mouth 1.20 gm. a day. On the second day of treatment the temperature fell to normal and the quinine was suspended. After the 15th daily injection of adrenalin 1/10 mgm. fever returned and quinine was given. The fever was quotidian. During the third paroxysm the symptoms became grave, temperature 40.2 blood-stained bilious vomiting delirium, diffuse abdominal pain small frequent pulse, 160 and rapid superficial respiration. Quinine was given and the condition improved. The following day the adrenalin injection was followed by a return of the grave symptoms with diarrhoea. A second injection of adrenalin was given on that day and 0.5 gm. of quinine intramuscularly. Improvement followed. Injections of adrenalin 1/10 mgm. were given twice daily and one gram of quinine intramuscularly during the six days that the fever lasted. Thereafter adrenalin injections were given once a day till the end of the course of treatment. The patient made a complete recovery.

The appearance of pernicious symptoms for the first time during a relapse three months after the primary attack in which grave symptoms did not appear is of interest as is also the apparent efficiency of adrenalin in relatively large doses, in combating pernicious symptoms.

N II

MARASOV (G.) A doença de Addison de origem palúdica. [Addison's Disease of Malarial Origin. — *Brasil Medico* 1939 Jan. Vol. 53 No 5 pp 83-85 [20 refs.]

A discussion of the literature of cases with symptoms of Addison's Disease in which malaria infection appeared to be the aetiological factor is followed by a description of two illustrative cases. They occurred in Spain both were *P. vivax* infections. The author concludes that the malaria parasite can produce symptoms of suprarenal insufficiency and that in individuals with a constitutional predisposition this acute insufficiency can develop into a chronic condition that is to say Addison's Disease. Such may occur in severe tropical infections as well as in benign tertian infections of Western Europe.

A IV

SIEGEBEEK VAN HEUKELOM (A.) De behandeling van acute malaria kinine of atebine? [The Treatment of Acute Malaria. Quinine or Atebina?] — *Nederl Tijdschr v Geneesk* 1939 Apr 1 Vol. 83 No 15 pp 1447-1455

1. DURAND (Paul) Action des dérivés sulfamidés et sulfonés sur l'hématozoaire du paludisme. [Action of Sulphonamide Derivatives on the Malaria Parasite.] — *Arch Inst Pasteur de Tunis* 1939 Mar Vol. 28 No. 1 pp 82-83

2. — Action des dérivés sulfamidés et sulfonés sur l'hématozoaire du paludisme — *Bull Soc Path. Exot* 1939 Mar 8 Vol. 32 No 3 pp 283-290.

1. This is a report on the treatment of 36 patients suffering from either *vivax* or *falciparum* malaria with various sulphonamide derivatives. The infections were in no case recent the patients were suffering from relapses. The derivatives used were rubiazol (prontosil) septasine

soluseptasine rodilone and septoplux (sulphanilamide) All of these preparations were ineffective in certain cases In many cases fever was suppressed sufficiently rapidly but relapses were not rare, sometimes these occurred before the end of treatment In half the cases action on schizonts was observed Gametes especially crescents were more resistant In two ~~very~~ cases treated with rodilone gametes disappeared while schizonts persisted The author concludes that the action of these drugs is not regularly effective enough for them to replace quinine or the usual antimalaria synthetic products in the treatment of malaria but the fact that they do at times possess antimalaria activity warrants a continuation of such observations more especially if new derivatives should be produced

ii This appears to be a very similar account of the same cases

N W

LATASTE (C) NGUYEN VAN LIEN & FARINAUD (M E) Recherche et dosage de la quinacrine dans le sang [Determination and Estimation of Quinacrine in the Blood.]—*C R Soc Biol* 1939 Vol 130 No 5 pp 422-424

The methods of Chopra and Roy and of Hecht did not permit the estimation of the very small amounts of quinacrine generally present in the blood of patients undergoing curative or preventive treatment. The authors' method is as follows A large quantity of blood 25 cc. is taken and an anticoagulant liqueur (sodium polyanethol sulphate see this *Bulletin* 1938 Vol 35 p 704 and *Bulletin of Hygiene* 1938 Vol 13 p. 663) 0.20 gm per litre of blood added. The blood is centrifuged for a considerable time in a tube graduated in tenths of a cc. The volume of the cells can be read directly.

To the sample to be examined is added an equal quantity of 60 per cent pure potash rapidly liquefied in a water bath at 100 C. The first extraction is done with Hecht's solvent pure benzene free from thiophene 8 parts amyl alcohol 2 parts This takes up the blood pigments and the acridine. Prolonged shaking is followed by centrifuging. The solvent is pipetted off. The process is repeated, the washings being added to the solvent.

The total benzo-amylic extract is then treated with $\frac{1}{10}$ hydrochloric acid first with 3 cc then 2 cc and finally 1 cc decanting each time the aqueous solutions which are collected in a colourless tube of 10 to 12 mm diameter. The blood pigments remain in the benzo-amylic fraction. After alkalinization the acridine is collected in a thin layer of amyl alcohol. This extract contains the whole of the quinacrine in the sample. It is compared in diffused light with standard dilutions of the drug similarly treated ranging from 0 to 50 γ by 2.5 γ gradations ($\gamma = 0.001$ mgm). By this method quantities as small as $\frac{1}{10}$ mgm of quinacrine per litre of blood can be estimated with an error not exceeding 10 to 15 per cent. [See also this *Bulletin* 1938, Vol 35 p 569.]

A W

LATASTE (C) FARINAUD (M E) & NGUYEN VAN LIEN La répartition erythroplasmatique de la quinacrine [The Repartition of Quinacrine between Red Cells and Plasma.]—*C R Soc Biol* 1939 Vol 130 No 6. pp 522-525

Can an elective affinity of quinacrine for red cells explain the schizonticidal action of that drug? To answer this question the

authors, employing their method described above examined a patient under treatment with quinacrine for two periods of five days each, with an interval of two weeks 0.3 gm. a day. The first definite appearance of the drug in the blood occurred after a delay which may extend to 2 or 3 days from the beginning of treatment. The maximum concentration was found on the day following the administration of the last dose. The drug disappeared from the blood 5 or 6 days after the end of treatment. The total amount of quinacrine in the blood was but a fraction of the amount ingested, about 4 per cent. The drug had a very definite affinity for red cells the amount of quinacrine recovered from red cells was three times greater than the amount recovered from the same volume of plasma. The fixation of quinacrine by red cells is not a vital phenomenon it can be demonstrated *in vitro*. There is a relationship between the quantity of protein and the concentration of quinacrine. \ W

FARDAUD (E.) LATASSE (C.) BACCIALOZE (L.) & CANET (J.)
Rapports entre la concentration sanguine et l'élimination urinaire de la quinacrine [Relationship between Blood Concentration and Urinary Excretion of Quinacrine.]—*C. R. Soc. Biol.* 1939 Vol. 130. No. 7 pp. 623-624

The maximum concentration of quinacrine in the blood of Annamite patients treated with 0.30 gm. a day for 5 days varies between 0.60 and 1.50 mgm. per litre. In two patients the relationship between this concentration and the urinary excretion of the drug was studied. The urinary excretion reaches its maximum the day the last dose is taken small quantities can be detected in the urine for a considerable time thereafter. If the treatment be then repeated the urinary elimination of the drug increases immediately after the first dose indicating an accumulation of the drug in the organs. In one patient whose daily excretion of urine was 1,000 cc. the maximum daily elimination of quinacrine was 18 mgm. after a latent period of several days and thereafter he continued to excrete 9 to 10 mgm. a day till the treatment was repeated. The second patient excreted from 1,500 to 2,000 cc. of urine a day he began to excrete the drug after a shorter latent period the maximum amount being 34 mgm. in 24 hours and the residual elimination was at a rate of 5 mgm. a day. The maximum concentration of the drug in the blood for any given individual remains constant whatever the number and frequency of treatment. The saturation of the tissues that have accumulated the drug resulting from a repetition of treatment, is evidenced by a sudden increase in the amount eliminated in the urine but not by any increase of the blood concentration of the drug above the maximum previously noted. \ W

HILFTH (Walter) Die Chemotherapie der Malaria auf Grund neuer parasitologischer Erkenntnisse [The Chemotherapy of Malaria on the Basis of Recent Knowledge of the Parasites.]—*Wienck Med. Wch.* 1939 Mar 10. Vol 89 No 10. pp 382-385.

Besides measures against mosquitoes attempts have been made to interrupt the developmental cycle of malaria parasites in man and mosquitoes by means of drug. Quinine and atabrin are effective clinically while plasmoquine act against the sexual forms in malignant

tertian malaria and prevents the fusion of male with female gametocytes and also appears to be more efficient in preventing relapses.

Recently Certuna was introduced and is well tolerated besides it does not give rise to methaemoglobin formation or secondary symptoms. It can prevent the exflagellation of male gametocytes and is active against the gametocytes of malignant and benign tertian parasites. It possesses the novel property when given in minimal doses of arresting the development of the fertilized female at the oöcyst stage. It has no prophylactic action in induced human malaria.

So far no causal prophylactic is known. A stage in development between sporozoites and intracellular forms has been suggested to explain long incubation periods and the inactivity of drugs in general as well as relapses. In the case of paralytics inoculated with blood a small dose of drug on the other hand, gives rise to cure as the intermediate stage of the parasite is here probably absent.

The first positive discovery of the possible intermediate stage was made with *P. elongatum*. Later with the same parasite pigmentless forms were demonstrated in endothelial cells and subsequently for *P. gallinaceum* and *P. cathemerium*. The author considers that these unpigmented forms are part of the developmental cycle of the parasite. As with sporozoites these forms are not affected by known drugs in the same way as intracellular forms but plasmoquine may be an exceptional drug as the author's researches indicate.

Endothelial forms have been noted in the bone marrow of an African monkey and reported likewise for malignant and benign tertian malaria in man following sternal puncture at the end of the incubation period subsequent to sporozoite infection. The forms are similar to those found in bird malaria. The verification of these findings will help to clarify some nebulous points in the epidemiology of malaria and assist in further chemotherapeutical progress. J. D. Fulton

MOLLARET (P) & SCHNEIDER (J) Contribution à l'étude de la paludothérapie action d'un médicament gaméticide dans le paludisme thérapeutique [Contribution to the Study of the Anti Malarial Activity of a Gametocide in Malaria Therapy]—*Bull. Soc. Path. Exot.* 1939 Feb 8 Vol. 32 No 2 pp 207-221 With 8 figs

This concerns the action of rhodoprequine 0.03 gm a day for 3 days on the schizonts of *P. vivax*. The interesting observations recorded were all made on patients undergoing malaria therapy. The strain of *P. vivax* used has special characteristics. It has been transferred direct from patient to patient for ten years and has assumed the attributes of a fixed virus. Its incubation period has been reduced to 7 days—this period is not further reduced by intravenous injection. It is generally administered subcutaneously or intramuscularly. The interval between attacks of fever has been reduced from 48 to 42 hours. The febrile reaction is intense. The parasite density in the blood is small. The strain is extremely sensitive to quinine.

The authors have shown that rhodoprequine in the doses mentioned above in addition to its recognized gametocidal action, has a certain action on the schizonts of this strain. Its administration is followed, after a delayed final attack by a cessation of fever and the disappearance from the blood of both gametocytes and schizonts. If

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subsequently an auto-haemo-injection be given attacks of fever recommence and parasites reappear in the blood after an interval of from four hours to four days. These reappeared parasites are well developed forms the schizonts show no tendency to segment or to leave the red cell (Decourt's dysgonic action). If blood containing such forms be inoculated into another subject the schizogonic capacity of the parasites is regained. The inhibition of schizogony determined by rhodoprequine does not prevent the further development of gametes. \ 17

DECOURT (Ph) La lutte antiparasitaire. Son application dans la pratique. [Anti-Malaria Measures their Practical Application.] —*Bull. Soc. Path. Exot.* 1939 Jan. 11 Vol. 32 No 1 pp. 69-80.

Malaria prevailing in such varying conditions it is impossible to establish a standard method of antiparasitic activity that is generally applicable. With this fact in mind, the author proceeds to discuss the principles on which successful measures should be based. A study of the local problem is the first essential, parasitology and morbidity, anophelism and human geography. Splenic, splenometric and parasite indexes should not be confined to the child population adults should receive similar attention. The incidence of febrile attacks, mortality, still births, and the effects of morbidity on the social and economic life of the community all call for study. Serometric indices give valuable information as to the immunity of the community.

Collective prophylaxis with synthetic drugs involves the use of quinine and rhodoprequine or the association of the two, prenaline of these quinine is fundamental. A fixed daily dose of quinine should be used, the rhythm of administration varying with circumstances. Thus it may be advisable to administer the drug three times the first week, then weekly and subsequently increasing the intervals to ten days and finally twice monthly. If a large proportion of the population are submitted to treatment and if there is not free communication with other malarial communities that are not being treated, there are great advantages in associating a gametocide with quinine the administration of the drugs can be spaced out to a greater degree and more quickly than if quinine be used alone. If antiparasitic measures are applied on a sufficiently large scale administration of drugs twice a month should be considered the normal rhythm. Examples are given of very varied conditions that called for equally varying treatment. \ 17

CASSET (J) Note sur les résultats obtenus au cours de quatre années de prophylaxie collective antipaludique par médicaments synthétiques sur les plantations des Terres Rouges (Nord Cochinchine). Results of Four Years Mass Prophylaxis with Synthetic Drugs in Plantations in North Cochinchina. —*Bull. Soc. Path. Exot.* 1939 Jan. 11 Vol. 32 No 1 pp. 58-60.

This paper elaborates the general conclusions derived from four years experience of the prophylactic administration of quinine in the rubber plantations in the red-soil belt of northern Cochinchina, where malaria is persistently hyperendemic. The severity of the malaria is directly conditioned by the presence and prevalence of

A. minimus this is very little subject to seasonal variations. From the end of March to the middle of June and again in October and November there is some mitigation of the severity of the disease but only in the former period is the improvement sufficiently well marked to allow of temporary suspension or diminution of drug prophylaxis. It is recognized that in a hyperendemic region such as this the administration of drugs should never be regarded as the sole method of permanent prophylaxis excellent though the temporary results may be. Antilarval measures and improvement of the social life should go hand in hand with drug administration the latter being only an adjuvant.

The populations treated are subject to discipline and control an essential condition for successful drug prophylaxis. The drug was taken in the presence of the doctor or of another European. Many thousands of coolies have been treated with quinacrine but no untoward results have been noted. Discolouration of the skin has been exceptional and there has been no repugnance towards the drug such as was commonly evidenced to quinine. Synthetic remedies are undoubtedly more effective than quinine. A serious outbreak can be suppressed almost immediately by the administration to a village population of quinacrine 0.30 gm a day adult dose for three or five days examples are given. The working capacity of a labour force can thus be quickly regained but after a few weeks conditions relapse to their former severity in the absence of a follow-up treatment. For such continuous treatment the daily dose used was the same 0.30 gm. The frequency of the distribution varied with local conditions the chief of which is the degree of prevalence of *A. minimus*. Any standard treatment is a heresy. In general administration once a week was found necessary and sufficient. The arrival of heavily infected contingents of labourers a cold spell specially arduous labour or other adverse conditions sometimes necessitate more frequent administration every five days or even every three days. Experience has not shown that the association of a gametocide with quinacrine, in collective prophylaxis in such hyperendemic areas serves any useful social or economic purpose. N II

CLARK (H C) & KOMP (W H W) An Eighth Year's Observations on Malaria in Panama.—*Amer J Trop Med* 1939 Jan. Vol. 19 No 1 pp 33-46

As explained in previous reports of this series the main object of these studies is to evolve a method of malaria control applicable to a native population of tropical America where antimosquito measures cannot be used. Early attempts at eradicating the seed bed of infection gametocytes in young children and adolescents with drugs at present available had failed. Not all carriers of infection can be reached, and in a large number of cases no drug or combination of drugs can eradicate infection. The treatment of sub-clinical cases may destroy a certain amount of immunity. Drug control methods failed to control the cyclical epidemic of malaria that occurred in Panama in 1935. The present progress report contains nothing to modify these conclusions. In the year under review 1937-38 one group was treated with atebryn 0.1 gm. thrice daily for 5 days followed by plasmoquine 0.01 gm. twice daily for five days. Another group was treated with quinine sulphate 15 grains daily for 5 days followed by

plasmogquine 0.01 gm. twice a day for five days. The treatment was given to all parasite carriers discovered at monthly surveys. Both methods appeared to be equally effective. The parasite rates were the lowest yet recorded—a normal decline and treatment both contributed to this. Of individuals examined in all twelve-monthly surveys, 36.8 per cent had parasites in their blood as compared with 43.5 in 1936-37. *P. falciparum* was found in 75 per cent of the positive films. Only one infant under one year of age out of 53 examined was found infected. The method adopted has almost abolished clinical illness from malaria but the disease has not been eradicated. A rise in clinical malaria and in the general infection rate is expected when the overdue peak of the malaria curve occurs. In Panama transmission can occur throughout the year. Parasite rates are not related to rainfall.

N II

HACKETT (L. W.) RUSSELL (P. F.) SCHARFF (J. W.) & WHITE (R. Senior). The Present Use of Naturalistic Measures in the Control of Malaria.—*Bull. Health Organisation (League of Nations)* 1938 Dec Vol 7 No 6. pp 1016-1064. With 13 figs. 42 refs.]

In this useful report the authors consider the nature, applicability and limitations of 'naturalistic' methods of anopheline control and the results obtained thereby in many lands. Naturalistic measures are defined as deliberate extensions or intensifications of those natural processes which tend to limit the production of mosquitoes or their contact with man. These measures are classified as chemical, physical and biological. The chemical measures against aquatic stages of the mosquito are pollution of water and changing salt content of water. The physical measures are natural fills, warping, silting, sluicing, flooding, fluctuating water level, intermittent drying, agitating, stagnating (ponding) or setting water in motion, mudding, shading or clearing, and drying by planting. The biological measures are natural enemies (predators), changing flora and fauna, and off-season attack. In addition naturalistic measures against adult mosquitoes are referred to: chemical, creating repellent barriers of odorous plants, and administering drugs like sulphur which cause odorous perspiration; physical, destruction of shelters, clearing, creation of plant barriers to flight, and rendering bedrooms or dwellings unattractive as resting places; biological, introduction of natural enemies, deviation by animals, and winter killing. Of these naturalistic measures against adult mosquitoes only animal deviation needs serious consideration.

No new facts are reported, the purpose of the paper being to systematize existing knowledge. In doing this the authors have rendered useful service. Many of these measures are important because of their potential adaptability to rural areas where other methods of mosquito control have been impossible. Further progress requires increased knowledge of mosquito ecology: this calls for co-operation of medical, malarialogist, biologist, chemist, engineer and agronomist. Rural malaria is closely connected with agriculture and pisciculture. Measures that have already achieved success in certain areas and have possibilities of more general application include herbage packing, sluicing, shading, and the use of exotic fish like *Gambusia*. Some naturalistic methods offer the advantage of a combined attack on more

than one vulnerable point in the biology of the larva. Herbage cover pollutes water shades it and may obstruct egg laying mechanically. salinification may destroy larval food as well as larvae shading may limit egg laying or larval growth or inhibit sheltering algae. Photographs illustrating successful application of some of these methods add interest to the paper

N IV

MULLIGAN (H W) & AFRIDI (M K) The Prevention of Malaria Incidental to Engineering Construction—*Health Bull No 25 Malaria Bureau No 12* pp 11-52 With 8 photos on 4 plates & 11 figs. (6 folding) 1938 Delhi Manager of Publications. [7 annas or 8d]

The object of this Bulletin is to record in simple language the general principles which should be observed during construction works of various kinds so as to obviate the creation of conditions which will subsequently produce mosquitoes and malaria." These opening words of the pamphlet adequately describe its scope. It is well done. There is obviously no scope for originality in the compilation of a work of this kind but had the precautions which are clearly outlined been taken in the past the benefits conferred by engineering achievement would not have had to be offset by increased prevalence of malaria. Works of this kind should lessen the probability of future neglect in this important matter

N IV

GABALDON (Arnoldo) Generalidades sobre malaria y organización de la lucha antimalarica en Venezuela. [Malaria and Anti-Malarial Measures in Venezuela.]—*Bol Ministerio de Sanidad y Asistencia Social Caracas* 1939 Jan Vol. 4 No 1 pp 69-76 With 4 graphs & 2 figs.

[See this *Bulletin* 1939 Vol 36 p 91]

JANDOLO (Eliseo) Gli indirizzi della bonifica integrale nei rapporti con la malaria in Italia [Bonification in Respect of Malaria in Italy]—*Riv di Malariaologia* Sez. I 1938. Vol. 17 No 6 pp 462-474 English summary (7 lines)

This paper was presented to the International Malaria Congress at Amsterdam. It describes the development of complete bonification schemes recent legislation on the subject and the remarkable results following the reclamation and intensive cultivation of malaria stricken areas in Italy

N IV

EATON (Monroe D) The Soluble Malarial Antigen in the Serum of Monkeys Infected with *Plasmodium knowlesi*—*Jl Experim. Med* 1939 Apr 1 Vol. 69 No 4 pp 517-532. With 3 figs. [10 refs]

It has been shown that the serum of monkeys suffering from severe acute *Plasmodium knowlesi* infections contains a soluble antigen which in the presence of immune serum from hyper immunized monkeys gives a strong complement fixation reaction. The titre of the antigen is related to the extent of the infection during its acute phase. Intra venous injection of the serum containing the antigen into monkeys causes the production of specific complement fixing antibodies which

react with the serum antigen as well as with an antigen extracted from parasitized cells. As monkeys immunized with the serum antigen were in no way immune to infection there exists the possibility that the serum antigen was the product of the destruction of red cells. As the sera of certain monkeys and human beings infected with *P. knowlesi* give little reaction with the serum antigen and a stronger one with antigen prepared from parasitized cells it would appear that another complement fixing antigen is present in these cells. This soluble serum antigen is not excreted in the urine is labile to acids and alkalis resists a temperature of 56°C and is precipitated for the most part in the albumin fraction by ammonium sulphate.

C. M. WENYON

TUPI (A) & CIUCA (M) with the collaboration of G. RADENSKI & P. IOVASCU Contribution à l'étude des lésions histopathologiques dans l'infection expérimentale du *M. rhesus* au *Py. knowlesi* (Histopathological Lesions in Experimental *P. knowlesi* Infection in *M. rhesus*). Arch. Roumains Path. Expér. et Microbiol. Paris 1938. Mar. Vol. II. No. 1. PP. 33-84. With 33 figs. (17 coloured) on 17 plates. [107 refs.]

During the past three years in Rumania amongst other malarial studies the authors have investigated *Plasmodium knowlesi* infections in monkeys. The organs of a number of these animals which died of acute malaria or were killed at the height of their infection were utilized for histological studies. The results are carefully described in this paper which is illustrated by a series of 17 excellent plates 9 of which are in colour. The general conclusion reached is that the malarial infection in the monkeys is associated with an hypertrophy of the reticulo-endothelial system in those organs where the infected red blood corpuscles come into close contact with the histiocytes. This occurs chiefly in the spleen and liver and to a much less extent in the bone marrow. Even in the spleen it is chiefly in the cords of the spleen that the reaction occurs. It is much less marked in the venous Bulbroth where the hyperplasia occurs the histiocytes detach themselves and become free in the blood stream where they are carried to other organs and to the lungs. It is remarkable that the blood of the right heart contains a much larger number of these cells carrying the products of their phagocytosis than the blood of the left heart.

A point which is specially emphasized is the behaviour of the lymphoid follicles of the spleen. It is maintained that the lymphocytes do not become transformed into macrophages and that in those cases in which evidence of phagocytosis in the follicles is obtained it is carried out by certain histiocytes which are there and not by modified lymphocytes. The general tendency is for the lymphoid follicles to degenerate the surviving lymphocytes taking up a peripheral position. The lymphatic glands themselves behave in a similar manner and do not contribute to the defensive process. Similarly in the endocrine glands the histiocytes which do not come into intimate contact with the blood fail to respond. Haemoglobinuria being a feature of monkey malaria, the opportunity was taken of making a special study of the kidneys. The damage caused to the renal tubules and glomeruli are carefully described and illustrated. In general this is comparable to what occurs in human blackwater fever.

The investigation has been very carefully carried out and the paper should be studied by all those who are interested in the cellular reactions of malarial infections.

C M W

AFRIDI (M K) Observations on Extra-Abdominal Spleen in Monkeys Infected with *P cynomolgi* and *P knowlesi*—*Jl Malaria Inst of India* 1938 Dec Vol 1 No 4 pp 355-389. With 7 charts [21 refs]

By a surgical procedure the spleen of a number of rhesus monkeys was moved through an abdominal opening to a position on the pectoralis abdominalis muscle where it was allowed to remain in a subcutaneous situation. When the monkeys had recovered they were inoculated with either *Plasmodium knowlesi* or *P cynomolgi*. Observations were made on the increase in size of the spleen and the development of the parasites both in the peripheral blood and in blood taken from the spleen by puncture. In the case of *P cynomolgi* infections the chief enlargement of the spleen occurred one to four days after the parasites had reached their peak and had commenced to decline. Similarly when a relapse took place though parasites were few in number a considerable degree of splenomegaly occurred. In the case of *P knowlesi* infections the maximum enlargement of the spleen occurs before the height of the infection at which time a decrease in size may occur. In the case of *P cynomolgi* at the time of the crisis there is a marked irregularity in the cycle of development. The rate of increase in the number of parasites during the early stages of a *P knowlesi* infection in some cases appears to be greater than can be accounted for by the number of merozoites produced. This phenomenon is discussed without any explanation being offered. In the case of both parasites at the time of the crisis, abnormally small schizonts are liable to appear. Peripheral blood and spleen puncture blood were examined every two hours, and it was found in the case of *P knowlesi* infection that the peripheral blood was two hours behind that of the spleen as regards the number and stages of development of the parasites. There was thus a lag of two to four hours between the splenic and the peripheral blood.

C M W

CIUCA (M.) BADENSKI (G.) IONESCU (P.) & TERITEANU (E.) Contribution à l'étude du mécanisme de l'immunité acquise dans l'infection intentionnellement provoquée par le *Plasmodium knowlesi* chez l'homme. [Mechanism of the Immunity acquired in the Intentional Infection of Man with *P knowlesi*].—*C R Soc Biol* 1938. Vol. 129 No 34 pp 1234-1236

For the treatment of general paralytics the authors have employed the monkey malarial parasite *Plasmodium knowlesi*. It was observed that the majority of the patients after recovery from the malarial infection resisted entirely a second inoculation. In order to determine whether this was due to premunition or not two of these immune subjects were inoculated with a large dose of heavily infected blood. At intervals of 6 12 34 48 hours and 7 days 10 cc. of blood was taken and inoculated into susceptible monkeys. Only those receiving the blood taken after 6 hours became infected a result which proved that the inoculated parasites disappeared from the blood in between 6 and 12

hours. It would seem that after recovery from a *P. knowlesi* infection there is a definite immunity independent of a preinfection.

C M W

COGGESHALL (L. T.) The Cure of *Plasmodium knowlesi* Malaria in Rhesus Monkeys with Sulphanilamide and their Susceptibility to Re-infection.—*Amer J Trop Med* 1939. Nov Vol. 18. No. 6 pp 715-721

The author who has already published an account of experiments on the therapeutic effect of sulphanilamide on *Plasmodium knowlesi* infections in rhesus monkeys [this *Bulletin* 1938 Vol. 35 p. 897] in this paper describes further tests with this drug. In this case nine monkeys were used and treatment was commenced on the 4th to the 168th day of infection, parasites being demonstrable in the blood in all cases. In all cases the minimum dose being a single one of 1.0 gram given to one monkey parasites disappeared from the blood and daily examinations over a long period failed to indicate any relapse such as is frequent after quinine or atabrin treatment. As a further confirmation of cure blood was taken from the apparently cured animals and inoculated into clean monkeys. This again failed to reveal any latent infection though it is known that a single infected red cell is capable of giving rise to an infection. Furthermore, some of the treated animals were splenectomized without any infection being aroused. It is concluded that sulphanilamide in the cases treated completely eradicated the infection. All nine monkeys were subsequently re-inoculated. All became infected, but six recovered spontaneously an unusual result which indicated the existence of a residual immunity which was present as long as three months after the sulphanilamide treatment. The marked effect of the drug on *P. knowlesi* is contrasted with its failure in 30 cases of human *P. vivax* infections and in avian infections due to *P. lophurae* and *P. cathemerium*.

C M W

HELMINTHIASIS.

Précis of Abstracts in this Section

LEATHERS KELLER & MCPHAIL (p. 828) examined by the Stoll-Hau-beer technique nearly 30 000 residents in 543 rural communities in Florida and found a percentage infected with hookworms varying between 23 and 80 and in some districts observed a heavy infection to as many as 5 000 ova per cubic centimetre of faeces. SEHELT (p. 828) has reviewed the subject of hookworm infestation in Trinidad, dealing largely with its historical aspect. FERNANDEZ (p. 828) has done the same for Ceylon, but follows the historical introduction by recording the prevalence and importance of this infestation. In 1936 there were 1,839 deaths attributed to this cause and 258,720 cases were treated in the dispensaries. PEARSON & YANG (p. 829) from smear examination of a limited number of persons admitted to hospital found about 1 in 5 to be infested with hookworms in Shaoyang, Hunan. Some

provinces in Somaliland have been thought to be free from ankylostomiasis but MOISE (p 829) in the course of examining by the Willis technique 423 persons who had been negative to another found 45 per cent. positive and the relative proportions of *Necator* to *Ancylostoma* worms recovered about three to two. Infection by *Sch haematobium* was present in the same district.

D'ANTONI & ODOM (p. 829) describe a filtration (sieving) method of obtaining ova of helminths and cysts of protozoa from faeces and SAWITZ TOBIE & KATZ (p 830) have investigated the specific gravity of hookworm ova and find it to be for practical laboratory purposes approximately 1.055. DESCHIENS (p 830) describes a simple paper cone trap for obtaining larvae from a faecal culture.

PEERY (p. 831) gives an interesting account of the post mortem findings in three negroes dying after accidental poisoning by a mixture of carbon tetrachloride (1 part) and ethylene dichloride (3 parts) the one who lived longest had taken half a pint and died in 150 hours. FERNANDO and his colleagues (p 832) deduce after employing it in 41 adult persons with hookworm infestation that tetrachlorethylene had no toxic effect on liver kidneys heart or lungs but GUNewardene (p. 832) stresses the dangers of using this drug if it has undergone chemical changes, for phosgene is one of the products. Symptoms of intoxication by this were pallor shallow sighing respiration dim vision, impaired speech and drowsiness.

GARIN & ROMAN (p 833) rightly regard ankylostomiasis as an occupational disease among the miners in the Loire Valley and consider the question of prophylaxis on the usual lines of examination of workers (and prospective workers to prevent fresh introduction) and treatment by tetrachlorethylene of those found infested.

ROUBAUD & DESCHIENS (p. 833) record the interesting fact that certain fungi in their growth entangle and digest larvae of some species of nematodes among them those of *A duodenale*. This suggests the possibility of getting rid of infective larvae in the soil by seeding with these fungi e.g. *Dactyella ellipsospora*.

OTTO & KERR (p 833) record the results of their attempts at experimental immunization of dogs against *A caninum* by subcutaneous injection of living larvae.

Filariasis.—DASSANAYAKE (p 834) in a filariasis survey of Ceylon of which he is M.O. in charge found among 7,329 blood-smears taken between 9 p.m. and 1 a.m. a mean positive of 6.2 per cent. The proportions of *malays* to *bancrofti* were four to one. Galle leg is the common name in Ceylon for elephantiasis there but, although *bancrofti* is more common in Galle town this condition is due to *malays*. MITRA (p 834) found a case of *W bancrofti* infection in the Mikir Hills whereas in the North Cachar Hills about 100 miles further south, the prevalent *Filaria* is *malays*. VAN BEUKERING (p 834) makes an interesting observation. Examination of Mentawai Islanders in Sumatra did not discover any infected with filaria nevertheless he did find an *A. indones* in the convict barracks infected. He, therefore, examined the blood of the convicts (88 in number) and found three positive. He infers that the mosquito acquired it from one of the convicts who had come from Bandjermasin district. OLIVER A.G. & J. (p 835) note that filariasis is decreasing among the military but not among the civilians in Porto Rico. Twelve per cent of the soldiers were positive when their bloods were examined in 1903 only 3.7 in 1932 and 2.5 in 1937. It might be present without any clinical

[In the *précis* of the paper on filariasis by O'CONNOR and KNOTT in this *Bulletin* 1939 Vol. 36 p 143 it is stated that "These did not support their former conclusions that parturition in the adults is simultaneous and occurs about noon." This is incorrect. The *précis* should read as follows—"O'CONNOR and KNOTT (p 151) describe the pathological appearances in an excised varicose groin gland. Though supporting the view that parturition in the adults is simultaneous these appearances did not suggest that it always occurs about noon." C W.]

LEATHERS (W. S.) KELLER (A. E.) & McPHEAL (W. A.) An Investigation concerning the Status of Hookworm in Florida.—*Amer. J. Hyg.* 1939 Jan. Vol. 29 No. 1 Sect. D pp. 1-16. With 2 maps & 1 graph. [10 refs]

During 1937 and 1938 faeces were collected from 29,064 white residents of 543 rural communities in 56 counties of Florida. The faeces were then "stored at 40°C. until ready to be examined [an unusual step] the examination being by egg counts of 0.005 cc. of faeces suspended in 1 cc. of decinormal caustic soda solution the Stoll Hausbeer technique

The percentage found infected was 34.8 varying between 49.2 in the west 38 in the north-east 25.2 in the centre and 23.3 in the south though, throughout, the soil is favourable for development of hookworm larvae the more extensive agriculture and fruit growing in the south has improved the economic state and sanitary cleanness of those living there. Among 27,043 examinations analysed for sex and age the total, the male and the female percentages of infection were 34.4 38.4 and 30.8 the peak of infection by age lay between 15 and 19 years being 44.7 in total 51.5 in males and 37.7 in females though in these last it was 37.8 from 5 to 9 and again from 10 to 14 years. In the 10,126 faeces found positive the average number of eggs counted was 5,100 per cc. of faeces in 36.6 per cent of the positives the egg count was 2,600 or more, the level at which it is believed symptoms are likely to be present. It is estimated on this basis that in Florida 142,253 white persons have hookworm infection and 51,000 have hookworm disease. It was once more the case that the more persons in a family there were with hookworm infection the higher was the egg count per person. Of 4,121 faecal specimens got from negroes 19.9 per cent. were found positive with an average weight of infection of 1,800 eggs per cc. the age distribution was much as that for whites but the percentage who showed that egg count which is deemed sufficient to cause symptoms was a third of that shown by whites.

Clayton Lane

SEWELL (R.) A Historical Review of Ankylostomiasis in Trinidad.—*Caribbean Med. J.* 1938. No 1 pp 46-54

FERNANDO (P. B.) Ankylostomiasis in Ceylon.—*Jl. Ceylon Branch Brit. Med. Assoc.* 1938. Sept. Vol. 35 No 5. pp 365-376. With 2 charts.

After a historical survey the local importance of hookworm infection in Ceylon is stressed by the Registrar General's figures for 1936 namely 1,839 deaths, 14,693 cases treated in public hospitals, and 258,720 in

dispensaries. There follows consideration of symptoms clinical pathology (though here eosinophilia seems to have dropped out of a table showing typical findings in this infection) diagnosis treatment (where tetrachlorethylene is favoured and the importance of iron in defeating the anaemia is stressed) and prognosis with emphasis on the reticulocyte response C L

PEARSON (G H) & YANG (C T) Hookworm in Shaoyang, Hunan.—*Chinese Med J* 1938 Dec Vol 54 No 6 pp 574-578. With 1 map

Of 556 persons admitted to the Methodist Hospital Shaoyang Hunan in the first five months of 1938 112 or 20.1 per cent showed hookworm infection to a single smear. The authors have also analysed cases of infection from hospital returns for three previous years.

It is noted that this figure would obviously have been higher had concentration methods been employed. Of 374 cases of infection analysed for occupation nearly half were coolies or land workers while 73.1 per cent of infected were intimately connected with land. Of 404 cases analysed for sex men represented 94.4 per cent. [Apparently most of those attending hospital were males.] It is urged that by Government order all faeces should be stored for two months before being used on the soil as fertilizer not an impossible ideal since some farmers do so for their own purposes already. An easy way of getting a laugh from the farmer with his straitened means is to suggest that all working on the land should wear rubber boots.

C L

MOISE (Regolo) Osservazioni sulle elmintiasi d'interesse epidemiologico in Somalia (1932-1937) [Helminthiasis of Epidemiological Interest in Somaliland].—*Ann di Med Nav e Colon* 1938 Sept.-Oct. Vol 44 No 9/10 pp 444-451 With 2 plates

In 1933 there were examined 568 faeces in Provinces apparently free from hookworm infection. Of these 423 were examined by Willis's technique after having proved negative to ordinary examination presumably by smear and in 45 per cent of them eggs were found. Of 75 infected to whom carbon tetrachloride was given in unstated dose 12 passed no worms 46 passed fewer than 25 12 passed 25 to 50 4 passed 50 to 100 and 1 passed more than 100. Of 936 worms recovered 38 per cent. were ancylostomes and 62 per cent. necators. The word *anchilostoma* is used indifferently for hookworms in general or ancylostomes in particular. There are photographs showing familiar appearances of worms and sick.

Schistosomiasis was by *S. haematobium* but in addition to vesical infection its typical eggs were found twice in the faeces. C L

D'ANTONI (Joseph S) & ODOM (Vada) A Supplementary Basic Technique for the Recovery of Protozoan Cysts and Helminth Eggs in Feces. (Preliminary Communication).—*Public Health Rep* 1938 Dec 18. Vol 53 No 50 pp 2202-2204

A modification of the technique described in this *Bulletin* 1939 Vol 36 p 144

It having been discovered that hookworm eggs were held back when a faecal suspension was strained through a metal sieve with

60 meshes to the linear inch the original technique was modified so that the moist washed, faecal residue on the sieve was used instead of the original faeces. It was found that the sieve itself has little or no effect on retarding hookworm eggs since by putting a patient on a low residue diet only 0.2 per cent. of eggs are held back, while by adding gelatinous (i.e. adhesive) substances to the diet the percentage of eggs may be greatly increased by adding bran to the diet the percentage of eggs retained by the sieve reaches 4 per cent. In a normal diet the percentage of eggs remaining in the sieve is about 2.5 per cent.

[That hookworm eggs in watery suspension are themselves sticky was reported in 1908 by William Pepper, *Jl Med Res* Boston. This stickiness was the basis of the reviewer's diagnostic method, levitation [this *Bulletin* 1918 Vol 12, p 183 1919 Vol 13 p 208]. The great loss of eggs on straining through a wire sieve with 100 meshes to the linear inch was pointed out by the reviewer in comparing the results got from the same evened faecal suspension without and after such sieving [this *Bulletin* 1924 Vol 21 p 574 and *Trans Roy Soc Trop Med & Hyg* 1924 Vol 17 p 417 (Table X) this *Bulletin* 1929 Vol 26 p 605 and *Amer Jl Hyg* 1928 May Supp. p 33 (Table III)]. As compared with unstrained suspensions the strained ones showed respective losses in the three faecal specimens tested of 35, 54 and 60 per cent. of the eggs disclosed by the former but the former failed often greatly to show the real egg content of the suspensions for the numbers collected from them were respectively only 91, 31 and 48 per cent. of those disclosed by D.C.F.F.] C.L.

SAWITZ (Willi) TOBIE (John E.) & KATZ (Gertrud) The Specific Gravity of Hookworm Eggs.—*Amer Jl Trop Med* 1939 Mar Vol 19 No 2 pp 171-179 With 2 figs

1 By the use of the zinc sulphate buoyancy method the specific gravity of living eggs of *Necator americanus* has been determined to be approximately 1.055.

2 Dead hookworm eggs show a variation in their specific gravity probably due to the change in the permeability of the egg membrane.

3 Since the buoyancy method for the determination of the specific gravity of biological objects cannot avoid the possible interfering action of the chemical solution with the true density the specific gravity of 1.055 for eggs of *Necator americanus* is considered valid only for practical laboratory purposes and is not necessarily an intrinsic property of hookworm eggs.

[It is sixteen years since the reviewer found that for the practical laboratory purpose of diagnosis by D.C.F. (*Trans Roy Soc Trop Med & Hyg* 1923 Vol 16 p 274 Table V and this *Bulletin* 1923 Vol 20 p 847) a specific gravity of 1.150 was dependable for the floating of hookworm eggs while one of 1.100 was not.] C.L.

DESCHAMPS (R.) Procédé simple de récolte des larves strongyloïdes de nématodes dans les coprocultures. [Simple Method of collecting Strongyloid Larvae of Nematodes in Faecal Cultures.]—*Bull Soc Path Exot* 1939 Feb 8 Vol 32 No 2 pp 165-169 With 4 figs

The culture consists of faeces with an equal quantity of vegetable charcoal, animal charcoal, or wood ash incubated at 25°C. to 30°C. set

in a Petri dish. In its centre in a conical hollow is a cone of filter paper with 2 or 3 cc of water in it and this is the trap which the larvae reach. Evidently no attempt was made to discover its efficiency by comparing the number of larvae found in it with the number of eggs which had been present in the faeces. *A. duodenalis* and *S. fülleborni* were the nematodes concerned. C. L.

PEERY (Thomas M.) Carbon Tetrachloride Poisoning. A Study of Stages of Hepatic Damage and Repair in Man.—*Arch Pathology* 1938 Nov Vol. 26 No 5 pp 923-941 With 3 figs [49 refs.]

Three negroes found in 1935 a discarded tin of roach poison a mixture of carbon tetrachloride and ethylene dichloride in proportion of 1 to 3 and drank largely of it thinking it was alcohol the quantity taken by two was unknown that by the third who lived long enough in consciousness to be questioned was about half a pint they died respectively 6 to 11 63 to 68 and 150 hours after taking it

There is first considered the literature dealing with poisoning in man and of experimental studies in animals and then the symptoms and the lesions at autopsy. Case 1 was a negress of 65 who died in coma with blood urea nitrogen 44 mgm creatinine 2.6 mgm. and sugar 237 mgm. to the 100 cc and she had no lesions 2 days after death except scattered haemorrhages. Case 2 was a negro of 54 stuporous with blood-stained vomit blood urea nitrogen 63 mgm. creatinine 8.4 sugar 40 mgm. to the 100 cc and muscular twitchings autopsy immediately after death showed small haemorrhages particularly about the abdominal organs the microscope showed in the liver necrosis mostly in the central lobular zone where liver cells were replaced by red blood cells and where the reticulum fibres were disorganized there was no evidence of regeneration such as mitosis or the formation of young bile ducts. In the kidneys the greatest damage was in the cells of the convoluted tubes which were greatly swollen with granular cytoplasm and cell membrane indefinite. The capsular space was lined with swollen cells and itself contained fat droplets and eosinophil granular material which latter as well as red cells was present also in the lumen of the tubules. There was no tendency to form eosinophilic fibrils in the glomerulus as there is in glomerulonephritis. In the adrenals there was extreme vacuolation of some cells in the outer fascicular zone but no necrosis in the pancreas interlobular haemorrhage obstructed small ducts and small zones of necrosis were apparently related to these. There were haemorrhages too in heart lungs spleen small intestine and stomach the last having superficial cellular necrosis. The third patient aged 38 took as noted, about half a pint and vomited copiously and intermittently with blood in the vomit the liver's edge was 4 cm below the rib margin urea nitrogen of the blood 54 creatinine 8.2 sugar 82 serum calcium 8 mgm. in 100 cc of blood. At autopsy 12 hours after death there was jaundice numerous haemorrhages pneumonia in the lower lobes syphilitic aortitis the liver weighed 1 080 gm and on section was jaundiced soft and without normal structure the kidneys weighed 225 gm. each. Microscopically the central parts of the lobules of the liver had only collapsed stroma with some lymphocytes and red cells the peripheral parts had large cells with some mitosis and with bud like tubular projections pointing towards the centre of the lobule the

reticulum was condensed about the thickened central venule the kidneys showed rather more markedly the changes seen in case 2. It is pointed out that after poisoning by ethylene dichloride there has been moderate fatty degeneration of liver cells (but no necrosis), multiple haemorrhages and necrosis and calcification of epithelium of renal tubules.

C L

FERNANDO (P B) D SILVA (Maurice) STORK (G K B) & SIVATAMBY (Grace R) Tetrachlorethylene in the Treatment of Hookworm Disease, with Special Reference to Toxicity.—*Indian J Med Res.* 1939 Jan. Vol 28 No 3 pp 759-783 [19 refs]

Tetrachlorethylene in view of its low toxicity and efficiency is a very valuable drug in the mass treatment of ancylostomiasis.

The determining of the presence of eggs, and the counting of their numbers before and ten days after treatment by undisclosed technique was the method used to test the efficacy of the drug. After being shaken up into a fine suspension in *Mistura alba* it was given to adults in doses of from 3 to 8 cc. In 41 cases, and the percentage of cures estimated in this way varied from 44-44 to 100 as the dose was increased. It is, however laid down as a prerequisite for assessing the value of an anthelmintic drug, that there must be known the numbers of worms originally harboured, those removed by treatment and those still present after it. [The first and third will be reliable only if there is a constant worm-egg ratio and the removal here reported by tetrachlorethylene of nearly 20 per cent. more ankylostomes from one patient than should have been there by the egg count is further evidence of the inconstancy of this ratio as to the second there was once more noted the complete disappearance of eggs from the faeces with no worms passed, the host having evidently at last fed on the worms that had for long fed on him.] After determining the icterus index, the van den Berg reaction and the presence of bile salts, bile pigment and urobilin in the urine, and using the bromsulphalein, and the laevulose tolerance tests it is concluded that the drug has no toxic effects on liver kidneys, heart or lungs. Yet a few of those who received doses of 8 cc. or more showed temporary untoward effects as of an overdose of a narcotic drug. Children may be given tetrachlorethylene in doses of 4 to 5 times the age in minima.

C L

GUNewardene (S R) Decomposition of Tetrachlorethylene.—*Jl Ceylon Branch Brit. Med Assoc.* 1939 Jan Vol 36 No 1 pp 22-24

Quart bottles of tetrachlorethylene were noticed to fume when opened on receipt from the makers, and to have a pungent smell. The Government analyst reported phosgene present and none of the drug was administered, but earlier serious symptoms had followed administration of this drug in an estate with 250 labourers fortunately none fatal. The symptoms were rapid small pulse with pallor shallow and sighing respiration indistinct speech dimness of vision and drowsiness.

GARIN (Ch) & ROMAN Prophylaxie de l'anquilostomose des mineurs dans le bassin de la Loire [Prophylaxis of Ankylostomiasis in Miners of the Loire Valley]—*Ann d Hyg Pub Indust et Sociale* 1939 Feb Vol 17 No 2 pp 56-66 [Refs in footnotes.]

Ankylostomiasis in French miners is an occupational disease. Some of its symptoms and its life cycle are sketched. Prophylaxis should be by discovery and treatment of the infected for the former reliance being placed on a modified Telemann technique for the latter on tetrachlorethylene C L

ROUBAUD (Emile) & DESCHIENS (Robert) Capture de larves infectieuses de nématodes pathogènes par des champignons prédateurs du sol [The Capture of Infective Larvae of Pathogenic Nematodes by Predatory Soil Fungi]—*C R Acad Sci* 1939 Jan 23 Vol 208 No 4 pp 245-247

Will it prove possible to destroy infective larvae of hookworms and strongyloides present in and on the soil by seeding this with certain microscopic fungi?

This paper deals specially with the free living larvae of *Strongyloides fulleborni* from the chimpanzee and of *Ancylostoma duodenale* from man while the fungi were of five species *Dactylaria brochopaga* *Dactylella benibicoides* *Dactylella ellipsospora* *Arthrobotrys oligospora* and *Stylopaga hadra*. Members of these genera produce in the presence of these among other nematodes structures of a strangling or glutinous nature which capture these nematodes by a sudden enlargement of the cells which come in contact with the worms and digest them in 36 to 48 hours. Although the diameter of these larvae is as much as eight times that of the mycelium and though the strands of the latter may rarely be broken the larvae do not escape digestion C L

ROUBAUD (E) & DESCHIENS (R.) Destruction de larves infectieuses d'anquilostomes et d'anguillules intestinales par *Dactylella ellipsospora* [Destruction of Infective Larvae of Ankylostomes and Strongyloides by *D. ellipsospora*]—*Bull Soc Path Exot* 1939 Feb 8 Vol 32 No 2 pp 160-165 With 5 figs. (4 on 2 plates)

OTTO (G F) & KEER (H B) The Immunization of Dogs against Hookworm, *Ancylostoma caninum* by Subcutaneous Injection of Graded Doses of Living Larvae.—*Amer J Hyg* 1939 Jan Vol 29 No 1 Sect. D pp 25-45 With 4 graphs [29 refs.]

Immunization was by bi weekly hypodermic injection of living infective larvae of *A. caninum* in numbers increasing from 15 to as much as 60 000 with an infective dose of 120 000 to 200 000 five to seven months later. Before and during the period of experiment the faeces were watched by DCF for the appearance of eggs and these were numbered by the Stoll Hausheer method. The immunized animals were killed on day 35 all but one of the non immunized animals died before day 14.

Three litters of dogs, a total of ten animals were used to demonstrate the sharp difference between the active immunity to hookworm resulting from serial light infections and the partial refractoriness of mature dogs to initial infections. From 52 to 203 worms were recovered at autopsy from

actively immunized dogs given test doses of 120 000 to 200 000 larvae whereas, the unprotected litter mates produced 1,283 to 31 200 worms. Furthermore, the unprotected animals, with one exception, succumbed to the test infections whereas, the immunized animals were scarcely disturbed. In the discussion of these results and the previous work on dog hookworm it was concluded that there is nothing distinctive about the so-called age resistance but rather that maturity and generally good health are essential for the host to respond fully and quickly to the stimulus of invading worms : i.e. actively to acquire immunity.

[The note that immunized animals were scarcely disturbed perhaps applies to clinical state for in two immunized dogs the lungs were found almost solid with grey hepatization. The conclusion that maturity and general good health are essential for the host's proper response to infection is unlikely to apply to man in face of the findings as between white persons and negroes by LEATHERS KELLER and McPHAIL, see above p. 824.] C. L.

BLAUZ (J.) Considérations histo-pathologiques sur les lésions intestinales relevées dans un cas d'ankylostomose du noir. [Histo-pathology of the Intestinal Lesions of Ankylostomiasis].—*Bull. Soc. Path. Exot.* 1938 Dec 14 Vol 31 No 10 pp 919-921.

CROW (C. Y.) Notes sur quelques nématodes de l'Indochine française. [Nematodes of French Indo-China].—*Ann. Parasit. Humains et Comparés* 1939 Jan 1 Vol 17 No 1 pp 21-31 With 2 figs.

DASSANAYAKE (V. L. P.) A Note on Filariasis in the Southern Province, Ceylon, 1938.—*Jl. Trop. Med. & Hyg.* 1939 Feb 15 Vol 42 No 4 pp 61-63.

This report of the Medical Officer in charge of the Filariasis Survey Ceylon covers 7,329 blood smears made in three Districts between 9 p.m. and 1 a.m.

The percentage of positive examinations was between 0.6 and 14 mean 6.2. Of the infections, 80 per cent. were with *Mf. malayi* and 20 per cent. with *Mf. bancrofti*. The Pistia plant and *Mansonia uniformis* are abundant where the infection is by Malayan filariasis. *Culex fatigans* carries the Bancroftian form which is prevalent in Galle town. So well known locally is the association of filariasis with this town that Galle leg is the name in Ceylon for elephantiasis of that limb yet this is a lesion caused by the Malayan infection which does not cause genital infections. C. L.

MITRA (P. N.) Filariasis in the Mikir Hills.—*Indian Med. Gaz.* 1938 Dec Vol 73 No. 12 p 740 With 1 fig.

In the Mikir Hills, lying in the Districts of Silbagar and Nowgong south of the Brahmaputra, the blood from one filarial patient was reported on in the School of Tropical Medicine Calcutta as containing embryos which appear to be *Mf. bancrofti* whereas in the North Cachar Hills *Mf. malayi* prevails. C. L.

VAN BEUCKERING (J. A.) Filarialarve in een *Anopheles ludlowi* [Filarial Larvae in *Anopheles ludlowi*].—*Geneesk. Tijdschr. v. Nederl.-Indië* 1939 May 2 Vol 79 No 18 p. 1114.

Experimentally IYENGAR and RAO in 1932 were able to infect a high proportion of *A. ludlowi* var. *truxalis* with filarial embryos mature

larvae being found in 10 days in 28 out of 41 specimens [see this *Bulletin* 1933 Vol. 30 p 227] Examination of 150 inhabitants of the Mentawai Islands Sumatra by BOERS KLYN and BOON VAN OSTADE revealed none infected and the author himself examined 41 with the same result He did however find an infected specimen of *A. ludlowi* in the convict barracks and consequently examined the blood of the convicts 86 in number and found three infected all of whom had come from Banjermasin district The mosquito must he states have infected itself from one of the convicts H H S

OLIVER (Andrés G.) & OLIVER (José) Filariasis In Puerto Rican Soldiers. A Survey.—*Puerto Rico Jl Public Health & Trop Med* 1938 Sept Vol. 14 No 1 pp 18-20 [Spanish version pp 21-23]

Comparison of the results of three surveys made on Porto Rican soldiers in 1903 1932 and 1937 leads to the conclusion that filariasis is disappearing rapidly from the soldiers

In 1903 ASHFORD found microfilariae in the blood of 12 per cent of 250 soldiers stationed at Cayley a hill station who before enlistment had lived in crowded towns and a large proportion had presumptive evidence of infection before entering the service In 1932 ASHFORD and SVYDER examined 480 native soldiers stationed at San Juan and found microfilariae in the blood of 3.7 per cent In 1937 the authors surveyed 794 men 544 stationed at San Juan with 2.5 per cent positive for microfilariae and 250 at Cayley with 0.4 per cent (1 man) positive moreover 11 of the 18 men positive in 1932 were still in the service and 10 of them had no symptoms and no microfilariae in the blood It is pointed out that there is no such lessening of infection in civil life ASHFORD in 1902 estimated 10 per cent of the population of Ponce as infected O CONNOR and HULSE found infection in 28.3 per cent. of 2 098 persons in Porto Rico in 1929-31 and TAMPE 7.7 per cent. of 518 persons in Santurce in 1931 C L

HU (Stephen M. K.) Preliminary Observations on the Effects of Filarial Infection on *Culex pipiens* var *pallens* Coq.—*Chinese Med Jl* 1939 Feb Vol. 55 No. 2 pp 154-161

A report on 200 infected *C. pipiens pallens*

The data so far obtained appear to indicate that the mosquitoes which were able to survive longest in the infected lots were generally either those that were negative to infection or those that were harbouring few larvae. However those that succumbed soon after the completion of the incubation period consisted of many lightly infected as well as the heavily infected specimens.

C L

HU (S. M. K.) Observations on the Development of Filarial Larvae during the Winter Season in Shanghai Region.—*Amer Jl Hyg* 1939 Mar Vol. 29 No 2, Sect. D pp 67-74 With 3 figs.

"1 It was experimentally found that, under winter conditions in Shanghai during 1935-36 few of the microfilariae ingested by *Culex pipiens* var *pallens* from a case of *Wuchereria bancrofti* infection were able to penetrate into the coelomic cavity of their mosquito host For example 57 living and 54 dead microfilariae were present in the stomach contents

of a mosquito dissected on the twelfth day after its only infective feed. [The latter sentence is taken from the text itself.] Those which succeeded were found unable to undergo development in the mosquitoes.

" 2 Some infective filarial larvae which developed from experimentally infected *Culex pipiens* var *pallens* during the latter part of November were found able to survive in their mosquito hosts until about the middle of the following March.

3 That the infective filarial larvae would be able to survive longer in the *Culex pipiens* var *pallens* if they were not exposed to the low temperature prevailing during the winter season was indicated by the results of an experiment whereby some of the infected mosquitoes were kept in a slightly heated room while others were kept in an unheated room.

C. L.

HU (S. M. K.) Studies on the Susceptibility of the Shanghai Mosquitoes to Experimental Infection with *Wuchereria bancrofti* Cobbold. VI. *Culex rapax* Wiedemann.—*Peking Nat. Hist. Bull.* Peking 1938 Vol 13 Pt 2 pp 113-118. [Summarized in *Rev. Applied Entom.* Ser. B 1939 June Vol. 27 Pt 6, p 124.]

During 1934-35 experiments similar to those already noticed were undertaken in Shanghai to determine the susceptibility to infection with *Filaria* (*Wuchereria*) *bancrofti* of females of *Culex rapax* Wied. reared from larvae collected locally. Of the 206 mosquitoes dissected 13-21 days after the infecting feed 189 harboured infective larvae. The average number of larvae per infected mosquito was 10.2. Infestation was exceptionally heavy in a few of the mosquitoes, and one dissected 13 days after the infecting feed harboured 111 infective larvae. The normal completion of development of so many larvae is considered to indicate that this species is a very suitable intermediate host. When a series of *C. rapax* was fed at the same time as a series of *C. pipiens* var *pallens* Coq. on the same infected person 74 out of 78 of the former and 47 out of 49 of the latter were found to harbour infective larvae after 12-18 days, the average number of larvae per infected mosquito being 10.9 and 9.3 respectively.

YOKOGAWA (Sadamu) Studies on the Mode of Transmission of *Wuchereria bancrofti*.—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939 Feb 28 Vol 32 No 5 pp 653-668. With 4 figs. [13 refs.]

— Investigations on the Mode of Infection of *Wuchereria bancrofti*.—*Japanese J. Med. Sci.* Pathology 1939 Vol 3 No 3 pp 167-181. With 6 figs. on 1 plate. [14 refs.]

These two papers on the transmission of *W. bancrofti* cover the same ground and largely use the same words in doing so. They deal with the question whether besides the mosquito in which the larva develops there is a second host in which it lies in wait for a chance to infect man.

After a historical survey, the experiments done in Yokogawa's laboratory by ABE [this *Bulletin* 1938 Vol 35 p 399] are tabulated; they were made to determine the viability of infective larvae in various media. When these larvae were placed in water with *Cyclops leuckarti* and *C. fimbriatus* they were eagerly eaten and completely digested, and though rarely eaten by *Diaptomus* they were as fully digested when they were not were other forms of animal life which frequent domestic water cisterns implicated. It was observed that larvae live longer in water at room temperature than at body temperature—a phenomenon "unreported by a previous observer." [It

falls into line with the observation (BAHR *Filariasis and Elephantiasis in Fiji* Report to the London School of Tropical Medicine 1912 pp 182-183) that microfilariae live in citrated blood for 3 days at room temperature and for 12 hours at 37°C. In monkeys fed with infective larvae placed on a banana or having had these introduced into a loop of jejunum no trace of infection could be found in the body. In 569 persons examined in the village of Ohama on Ishigaki Island there were from 8 to 20 years of age quinquennial percentages of infection of 22.92, 21.14 and 26.69. It is evident that the rate per 5 year period increases extremely slightly so that it may be assumed that fresh infections rarely occur. Consequently even if we admit the mosquito to be the vector filariasis does not spread as rapidly as does malaria which is known to be transmitted by anopheles. Comment is not made in the script of the fact that the respective decennial infection rates between 21 and 50 were 44.64, 53.85 and 56.00. Of 221 female *Culicines* two were infected the low infection rate for a heavily infected region throwing doubt on the rôle of the mosquito as vector. Larvae of an unstated sort obtained from two mosquitoes (? by dissection) failed to enter the abdominal wall of a pup or the ear of a mouse when the skin was intact but when a mouse was treated by the depilatory *Eva* cream and the skin then needled one larva was found in the subcutaneous tissue. After mosquito bites larvae were found on and in the skin and in one case (illustrated) it is believed that the larva entered through the mosquito puncture. It is concluded that the spread of the disease is largely a matter of chance its transmission being limited by a number of adverse factors. C. L.

YOKOGAWA (Sadamu) & YOSHINO (Takayoshi) On the Spread of *Wuchereria bancrofti* and its Relationship to the Human Flea, *Pulex irritans*.—*Taiwan Igakkai Zasshi* (Jl Med Assoc Formosa) 1938. Oct. Vol. 37 No 10 (403) [In Japanese pp 1540-1543 English summary p 1544.]

Since the extensive distribution of Bancroftian filariasis is yet not as extensive as that of *Culex fatigans* these writers in the hope of finding another larval host experimented with *Pulex irritans* (363 male and 528 female fleas). All larvae found in the fleas were in clots in the midgut and apart from unsheathing were unchanged. It is concluded that the human flea has nothing to do with the spread of filariasis. C. L.

GALLIARD (H.) Sur la biologie des culicidés du genre *Mansonia* R. Blanchard en Indochine. [Biology of *Mansonia* Species in Indo-China.]—*Ann Parasit Humain et Comparé* 1939 May 1 Vol 17 No 3 pp 177-188 With 1 text fig & 6 figs. on 2 plates [14 refs.]

The three species of *Mansonioides* which occur in Indo-China *M. indianus*, *M. annulifera* and *M. uniformis* are probably concerned in the transmission of *Microfilaria malayi* and *Wuchereria bancrofti* though conclusive evidence is lacking. In Tonking the larvae of these mosquitoes are associated much more commonly with the water hyacinth *Eichhornia crassipes* and with the submerged leaves of *Salvinia natans* than with the water lettuce *Pistia stratiotes*. In the south on the other hand, in Cochinchina and Cambodia they are

associated chiefly with *Pistia*. The author has not confirmed the observation that decaying vegetation is necessary for the development of the larvae. He has also obtained transformation from fourth stage larvae to adults in distilled water without any plants. Apparently the larvae and pupae can on occasion obtain oxygen directly from the water surface like other genera of mosquitoes. *V B Wigglesworth*

MEYERS (F M) & KOUWENKAAR (W) Over hypercoenophilie en over een merkwaardigen vorm van filariasis. [Hypercoenophilia and an Unusual Form of Filariasis].—*Geneesk. Tijdschr. v. Nederl. Indië* 1939 Apr 4 Vol 79 No 14 pp 853-873 With 8 figs on 2 plates [22 refs.] English summary

In seven Javanese men the authors observed a general swelling of the superficial lymphatic glands with particularly severe tumefaction of the glands in and under the groin, associated with a severe coenophilia of the blood. In the excised glands from the groin eosinophilic abscesses were found, containing a small worm with all the characteristics of a microfilaria. In some cases at the periodical observations over a period of 3 years or more no filaria could be found in the blood and the coenophilia remained constantly on a high level. Some patients had an inflammation of the glands with purulent discharge. No symptoms of filariasis malaya or Bancrofti could be found. No adult filariae were seen in the excised glands. The clinical, anatomical and parasitological findings do not permit a definite diagnosis as to the species of filaria involved. Also the epidemiology gave no help in their determination, the cases all occurring in a non-endemic area.

Two patients suffered from asthma bronchiale and two from a haemorrhagic nephritis. It is suggested that these 2 symptoms together with the coenophilia may have a common allergic origin, brought about by the filarial infestation.

BOXER (C) Over hypercoenophilie in de milt gecombineerd met een filaria infectie. [Hypercoenophilia and Filaria Infection of the Spleen].—*Geneesk. Tijdschr. v. Nederl. Indië* 1939 Apr 4 Vol 79 No 14 pp 874-876 With 2 figs. on 1 plate English summary

Description of an infestation of the spleen-tissue with microfilariae in a Javanese man, who was killed in a motor-car accident. The presence of the microfilariae was discovered during the routine histological examination of the internal organs. Nothing is known about the presence of microfilariae in the patient's blood. The other internal organs were negative however. The spleen had reacted with an extraordinary degree of coenophilia and some peculiar giant cells were noted, surrounding the terminal ends of the larvae. The extreme degree of coenophilia, for which no other explanation is available must have some connection with the presence of the microfilariae. It represents either an undescribed phase in the life of one of the common filarial species or a manifestation of an unusual filarial parasite and altogether this condition is in many ways comparable to the coenophilic microfilarial manifestations in lymph glands described by MEYERS and KOUWENKAAR in this same number.

MAKAR (Neguib) On Filariasis of the Intrascrotal Structures.—*Jl Egyptian Med Assoc* 1938, Nov Vol 21 No 11 pp 682-715 With 17 figs (15 coloured on plates) & 11 microphotographs. [37 refs.]

A report on 10 cases of endemic funiculitis, and on 38 out of 100 cases of chronic intrascrotal swellings not gonorrhoeal in origin and

operated on during the last four years and which were filarial in origin

Of the acute cases 1 was gangrenous 1 was non-suppurative and 8 were suppurative. The microscopic appearances were those of sepsis intratesticular haemorrhage and lymphocytic infiltration. In 3 gangrenous or acute suppurative conditions with orchidectomy no worms could be found. In a fourth orchidectomy the lesions were essentially those of chronic affection in a man with urinary bilharziasis subsequent examination showing many filarial worms in the cord lymphatics with in some parts histological findings peculiar to suppuration. In no other case were these worms found in the spermatic cord. In comment Makar concludes that worms in the cord lymphatics may die and be absorbed without trace if they remain sterile bacterial infection of different grades of virulence may be superadded, and equally here worms may die and be absorbed the effects on the various intrascrotal structure are considered.

Of the 38 chronic filarial lesions 19 affected the cord alone 6 cord and epididymis 3 cord, epididymis and tunica 4 the epididymis alone and 6 the tunica alone. They are considered under the anatomical headings concerned symptomatology diagnosis and treatment. As to the last the value of the sulphonamide group in bacterial infections is noted as is the risk that X rays may damage the testis. In surgical treatment it is urged that the surgeon should not forget that he is dissecting lymphatics the collateral circulation of which might already have been overtaxed by previous inflammations. Excision should therefore, as much as possible be restricted to the diseased tissues.

The reproductions of the microphotographs are not clear those of the paintings are vivid.

C. L.

LAMBRIGHTS (G.) Oedème filarien de la face. [Filarial Oedema of the Face.]—*Ann. Soc. Belge de Méd. Trop.* 1938. June 30 Vol. 18. No. 2. pp. 351-352.

LIEFELT (Heinrich) & MOHR (Werner) Zur Diagnostik der Filarienerkrankungen [The Diagnosis of Filarial Diseases.]—*Arch. Hock* 1938. Nov. 26 Vol. 17. No. 48. pp. 1684-1689 [11 refs.]

DEKOVAN (A. E. Botsford) Sulphanilamide for Filarial Lymphangitis. [Correspondence.]—*Brit. Med. J.* 1938. Oct. 29 p. 919.

In praise of sulphanilamide for filarial lymphangitis on an experience of one case observed for only 48 hours after an attack began

C. L.

POYNTON (J. Orde) & HODGKIN (E. P.) Two Microfilariae of the Kra Monkey (*Macaca irus*)—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Jan. 28 Vol. 32. No. 4. pp. 555-556.

Of these two microfilariae from *Macaca irus* one is indistinguishable from *Mf. malaya* and was found in one of eleven monkeys examined. Of species of *Mansonia* fed on this monkey infection took place in four of six *M. annulifera* in 18 of 21 *M. longipalpis* and in 34 of 36 *M. uniformis*. In all but one mosquito mature larvae were found on the tenth day. Attempts are being made to infect monkeys of this species with this infection derived from man and to trap others for dissection in order to recover the adult worms.

The second microfilaria is about 600 μ long and 5 μ wide, and probably the adult is not a parasite of man. C L.

UNDERWOOD (Paul G.) & HARWOOD (Paul D.) Survival and Location of the Microfilariae of *Dirofilaria immitis* in the Dog.—*Jl Parasitology* 1939 Feb Vol. 25 No 1 pp. 23-33 [19 refs]

1 An uninfected dog was transfused intravenously with blood containing approximately 233 000 microfilariae of *Dirofilaria immitis*.

2 The microfilariae survived in the blood stream of this dog for more than two years.

3 At autopsy about 2½ years after the injection of the microfilariae, no embryos could be found in the blood.

4 No increase in size of the embryos was noted at any time.

5 As other authors have noted, comparatively few of the introduced microfilariae appeared in the peripheral circulation following injection.

6 Lane's hypothesis that most of the artificially introduced microfilariae are removed by the cells of the reticulo-endothelial system and subsequently destroyed, is not substantiated.

7 Available evidence indicates that a part of the microfilariae are concentrated in the capillary networks throughout the body and a part leave the blood stream altogether this is possibly true for all microfilariae in the blood stream, whether sheathed or unsheathed.

8 Whether or not the microfilariae live for long periods under natural conditions in the presence of adult worms cannot be ascertained on the basis of a reliable data. There is evidence that the macrophage system, acted by some type of immunological reaction, may destroy large numbers of microfilariae in a short time, but there is also evidence which suggests that such reactions are of irregular occurrence and that they do not regularly affect microfilarial longevity or periodicity.

[The conclusions in paras 5 and 6 seem contradictory. In the experiment cited in the paper microfilariae were injected into the dog's blood in numbers corresponding to 100 per cc. of its total estimated volume. By next day the numbers were reduced to 4 per cc. most microfilariae had certainly been removed from the circulating blood. That the young of *M. bancrofti* are destroyed in numbers by the reticulo-endothelial cells is something more than hypothesis. There are the visual observations first that these cells are greatly increased in numbers in those parts of that system where microfilariae and other young filarial forms are especially collected, and second that many of these parasitic forms are markedly degenerate there. It is a conclusion which I think will be generally drawn. No visual evidence for para 7 is offered, the statement is inference. To suggest that there must be a hiding place used by *M. bancrofti* by day which yet has escaped detection by workers in tropical medicine for 50 years seems to reflect little credit on a band of able men.] C L.

AUGUSTINE (Donald L.) Observations on the Occurrence of Heartworms, *Dirofilaria immitis* (Ledy 1856) in New England Dogs.—*Amer Jl Hyg* 1938 Nov Vol. 28. No. 3 pp. 390-395 [10 refs]

One of the observations on this dog filariasis merits remembrance for human infections. Microfilariae were found in the blood of two cocker spaniel pups five months old. According to HALL, PRICE and WRIGHT (1934) maturity is not reached till this parasite is eight months old. Either this interval is at least not invariable or prenatal infection occurs. C L.

MOLSER (H) *Filaria perstans*—Arch f Schiffs u Trop Hyg
1939 Mar Vol. 43 No 3 p 130

Acanthocheilonema perstans is not a harmless parasite. It causes fever as high as 38° to 39°C (since this is attributable to no other cause) and the microfilariae disappear from the blood under intra-venous injections of 1 per cent. methylene blue beginning with doses of 2 cc. and rising to 10 cc. It at least merits investigation as to whether this parasite can cause illness. C L

EAST AFRICAN MEDICAL JOURNAL. 1939 Feb Vol 15 No 11
pp 369-377 Onchocerciasis [In East Africa]

A symposium of onchocerciasis in Equatorial Africa largely historical and already dealt with in this *Bulletin*. A letter from HAWKING reports that at Kakamega, Kenya he examined two groups of persons. The one consisted of 52 prisoners and mine labourers selected on account of possible eye trouble in them *Onchocerca* microfilariae were found evidently in the skin and nodules in the upper part of the body in 7. The other group was of 53 patients taken at random in a native hospital and in them these microfilariae were found in 20 and nodules in 1. C L

HARLEY MASON (R. J.) Filarial Blindness in Kenya—*East African Med J* 1939 Feb Vol 15 No. 11 pp 363-368.

Three cases are reported all coming from the Kakamega district of Kenya, in all of whom there were the ocular symptoms and ocular lesions associated with *Onchocerca* infection and a heavy eosinophilia, while in two of them *Onchocerca* larvae were recovered from the skin. Reference is made to HAWKING's findings in this district [see above]. C L

GOPSILL (W. L.) Onchocerciasis in Nyasaland.—*Trans Roy Soc Trop Med & Hyg* 1939 Jan 28 Vol. 32. No. 4 pp 551-552.

A report on 20 cases of onchocerciasis in the district of Cholo in the Shire Highlands.

No patients have been seen from Lower Shire or North Nyasa in the lowlands. In the fast flowing highland streams *Simulium damnosum* is found. In seven of the patients with nodules frequent and extensive blood examinations failed to disclose embryos and the same result followed examinations of 850 persons (even to the extent of five films every other day for 10 days) living in infected parts. In the same way 100 lymph smears from the 20 patients and from 80 others failed to show any microfilariae but these were once found in the blood during the actual removal of a cyst and again four hours later in a node puncture done in this person. No nodules in this geographical area were found in the scalp neck and upper limbs nor were there disturbances of vision or symptoms attributable to infection in the central nervous system although in one with a family history of epilepsy the attacks began when nodules appeared near the ninth rib mid axillary line and near the coccyx and disappeared when these tumours

were removed. In the same way where there has been referred pain it has disappeared with removal of the nodule concerned. Excised nodules have commonly contained four male and eight female worms.

C. L.

DUBOIS (A.) VITALE (S.) & BIRGER (Ch.) Contribution à l'étiologie de l'éléphantiasis congolais. Région de Betongwe-Chefferie Medjeje [The Aetiology of Elephantiasis in the Congo]—*Ann Soc Belge de Méd Trop* 1939 Mar 31 Vol. 19 No 1 pp 27-31

Microfilariae in the skin are fairly frequent in cases of elephantiasis in the Medjeje chieftainship. *Mf rostratus* in genital elephantiasis and *Mf streptocerca* in that of the lower limbs, but the fact that the former has a low percentage among the sick and the latter is very abundant in the healthy does not allow of the conclusion that these filariae alone are the cause of the elephantiasis.

C. L.

DUBOIS (A.) & FORRO (M.) Contribution à l'étiologie de l'éléphantiasis congolais. Le rôle de *O rostratus* étudié au Nepoko [The Aetiology of Elephantiasis in the Congo. The Role of *O rostratus*.]—*Ann Soc Belge de Méd Trop* 1939 Mar 31 Vol. 19 No 1 pp 13-21

The investigations lead to the conclusion that *Onchocerca rostratus* favours the appearance of elephantiasis but is not its primary cause. In this region some 80 per cent of persons show *Onchocerca* nodules, in 73 inhabitants examined at night *Mf bancrofti* was absent and in 56 per cent. of persons with genital elephantiasis no *Onchocerca* nodules were found in spite of very close examination.

C. L.

DÉJOU (L.) Suppuration d'un kyste à onchocercques (*Onchocerca rostratus*) [Suppuration in an *Onchocerca* Cyst.]—*Bull Soc. Path Exot* 1938 Oct 12. Vol 31 No. 8 pp. 725-728

A swelling in the left buttock with fever and pain was incised and some cubic centimetres of turbid fluid escaped. Next day a bunch of worms lay on the dressing identified by ADVIER as *O rostratus* and one or two continued to be passed daily. The tumour was excised and proved to be an irregular fibrous mass "as large as a nut [volume global d'une noix] in the subcutaneous tissue adherent to the muscle loculated on section with *Onchocerca* worms in cavities.

C. L.

ADVIER & DÉJOU (L.) Arthrite aiguë du genou avec présence d'embryons d'*Onchocerca rostratus* dans le liquide articulaire [Acute Arthritis of the Knee. *Microfilaria rostratus* in the Articular Fluid.]—*Bull Soc Path Exot* 1938 Oct. 12. Vol. 31 No 8. pp 727-730

There was in fact a double parasitism with *Onchocerca* and *Dracunculus*.

The *Onchocerca* showed itself by acute arthritis of the left knee with many *Mf rostratus* in the synovial fluid, which contained many polymorphs but no bacteria on culture and behind the knee in the

popliteal space by a tumour which excision showed to be a subfascial cyst containing adult *O. volvulus*. The Dracunculus infection showed itself later under the left ligamentum patellae above the right internal malleolus another worm a little higher up a fourth on the right thigh and a fifth on the right heel. In the sinus where the third worm pointed there were embryos of *O. volvulus* as well as of *D. medinensis*. It is stressed that two examinations made at an interval of two days have shown one many microfilariae the other none. C L

GIBBINS (E. G.) Simuliidae and Onchocercelasis in Uganda.—*East African Med J* 1939 Feb. Vol 15 No 11 pp 378-384 [19 refs.]

WAXSON (M.) Observations sur la biologie des cératopogonidés et des simuliidés du Bas-Congo. [Biology of Ceratopogoninae and Simuliidae in the Lower Congo].—*Ann Soc Belge de Méd Trop* 1939 Mar 31 Vol 19 No 1 pp 87-112. [13 refs.]

HUARD (P.) Quelques remarques sur les arthrites par ver de Guinée. [On Guinea-worm Arthritis].—*Bull Soc Path Exot* 1938 Oct. 12 Vol 31 No 8. pp 722-725

Two cases of streptococcal inflammation in the knee joint were certainly and a third was probably associated with an adjacent guinea-worm. In two the joint was afterwards left rigid in the third it could be bent to a right angle. C L

GALLIARD (Henri) Unité ou pluralité des *Strongyloides*. [Are there One or Many *Strongyloides* Species?].—*C. R. Soc Biol* 1939 Vol 130 No. 5 pp 413-416

This discussion of the writings of various workers points out the structural similarity of *Strongyloides* species from different animals and in considering the question of acquisition of infection by man from the dog points out the complexity of the epidemiology—the result of the great instability of types which come from different sources. C L

DE PAULA E SILVA (Geraldo Siffert) *Estrongyloidiasse* duodenal. [*Strongyloides stercoralis* in the Duodenum.].—*Brasil-Médico* 1938, Sept 10 Vol 52 No. 37 pp 835-839 English summary

Examination of material aspirated from the duodenum proved a far more certain means of diagnosis of strongyloides infection than did faecal examination.

Of 1942 persons examined all in good circumstances 17 were found infected with strongyloides. 13 of these showed larvae in the duodenal contents only 2 in the faeces only and 2 in both. In 11 there was complaint of pain in the upper abdomen fullness or weight after food salivation or diarrhoea. All were nervous local epigastric tenderness was present in 6. X rays showed evidence of duodenitis in 2 while the microscope gave evidence of irritation or inflammation in 9. There was hyperchlorhydria in 2 achlorhydria in 4 and normal values in the rest. C L

SIMPSON (Virgil E.) *Strongyloidiasis*.—*Jl Amer Med Assoc* 1939
Mar 4 Vol. 112 No. 9 pp. 828-832. [34 refs.]

The treatment by compound solution of iodine was carried out successfully in 9 cases as follows —

"A saline purgative was administered one hour before supper. This was expected to act before the patient a bedtime. Breakfast was withheld the following morning. A transduodenal tube equipped with a Lyon metal bulb was introduced, the stomach irrigated and the tube allowed to pass into the duodenum. The duodenal contents were aspirated for the twofold purpose of securing a specimen for laboratory examination for parasites and to remove contents, thus lessening the dilution of the drug to be introduced into the bowel.

Compound solution of iodine was then introduced into the duodenum and the tube withdrawn. The dose finally fixed was 60 minims (4 cc.) and was given on alternate days until neither the duodenal contents nor the feces showed ova, parasites or larvae. After two weeks the duodenal contents and feces were examined. If the results were negative the patient was instructed to return in one month for another laboratory study.

An energetic mop-up campaign of washing scrubbing, sunning, painting, and liming the treating or killing of all household pets and the examination and treatment if necessary of all members of the family are held to be essential measures.

Examination of the water supply has shown no ova in my experience."

[Liq Iodi. Co. U S has the composition Iodine 5 potassium iodide 10 water to 100 and is approximately the same as Lugol's solution, the dose of which is minims 5 to 10] C L.

TORRES (C Magarinos) & DE AZEVEDO (A Penna) *Lesões produzidas no homem por Strongyloides Sobre a hyperinfection* [Lesions produced in Man by Strongyloides. On Hyperinfection].—*Livro Jubilar do Prof L. Travassos* Rio de Janeiro. 1938. pp. 475-483. With 9 plates [24 refs.]

There are described the findings at autopsy in two persons with strongyloides infection and in whom the larvae (born presumably in the intestinal canal) had penetrated into the wall of the colon in great numbers and had been carried thence to lymph nodes, liver and lungs.

It is believed that all the larvae were in the rhabditiform stage. They entered the wall of the colon through ulcers of which there were a number (that is to say many larvae were found at their bases) but they were found also where there were no ulcers and they crept down Lieberkühn's glands and seemingly entered the connective tissue at the ends of these. In this tissue they caused diffuse haemorrhage and infiltration with polymuclear eosinophil, macrophage and giant cells. This region they left by lymph or blood escalator. Those travelling by lymph were apt to penetrate into the walls of the lymph vessels and cause subendothelial nodules while in a lymph node there was giant cell formation. Those which entered the blood stream might produce thrombosis in the coeliac veins, the clot being invaded by lymphocytes and macrophages. Larvae which had reached the liver might be found within the walls of the portal veins or in the portal spaces, surrounded by a cellular exudation. In the lungs [which they may clearly have reached by either blood or lymph escalator] they broke through into the alveoli and blood escaped with them. The illustrations are convincing C L.

SCHENKEN (John R.) & MOSS (E. S.) *Trichostrongylus colubriformis* in the Human Appendix Report of a Case in Louisiana.—*Jl Lab & Clin Med* 1938 Oct. Vol. 24 No 1 pp 15-17 With 1 fig

The first report of *Trichostrongylus colubriformis* in man in America though it is common in ovines there

In an appendix removed for recurrent abdominal pain there were found in the lumen two male *Enterobius vermicularis* and one male *T. colubriformis* identified by FAUST To the naked eye the appendix was normal in the wall were patches of plasma cells and some macrophages it is not believed that the parasites were concerned in the symptoms. No ova were found in the faeces though the girl had an eosinophilia of 7 per cent about a month later C L

GRAM (Eloise B.) & REARDON (Lucy) Studies on Oxyuriasis. XII Epidemiological Findings in Washington, D C.—*Amer Jl Hyg* 1939 Jan Vol. 29 No 1 Sect. D pp 17-24 With 2 figs (1 map)

Of 2,097 persons examined by the N I H swab in or near Washington 41 per cent were found infected by threadworms

This paper considers 1,362 persons from institutions already reported upon in the series as well as 735 from the general population and as regards the latter group the writers consider that it represents fairly well as to social and economic status a cross section of the white population of Washington. Those found infected were most numerous in but far from being confined to the older comparatively congested residential sections of the city round the Capitol While the numbers are felt not to be sufficiently large to constitute a fair sample of the whole population they do at least show that infection with *Enterobius vermicularis* is a public health problem of considerable importance without restriction of sex race age, social-economic status or place of residence. C L

NOLAN (M O.) & REARDON (Lucy) Studies on Oxyuriasis. XX. The Distribution of the Ova of *Enterobius vermicularis* in Household Dust.—*Jl Parasitology* 1939 Apr Vol. 25 No 2 pp 173-177

Ova of *Enterobius vermicularis* were found in dust collected at all levels in all of the rooms of 7 houses occupied by one or more persons heavily infected with pinworms. The ova in part at least, must have been carried by air currents. Infection by inhalation is therefore theoretically possible and should be considered in the prophylaxis and therapy of oxyuriasis.

The eggs were collected by passing a camel hair brush moistened with water over the surface being investigated it had been passed through a perforated rubber stopper fitting a test tube and was thus transported to the laboratory Here the brush was dipped gently into decinormal caustic soda solution in a deep well slide and examined. Of the 241 dust samples collected from these 7 houses threadworm ova were found in 221 (91.7 per cent.) and in largest numbers in bedrooms. About a quarter of the eggs were too disintegrated for the stage of development to be stated of the rest more than three-quarters contained fully formed embryos, and though only 15 of them were

mobile when examined, yet their appearance suggested that half the rest were viable or only just dead. This was confirmed by incubating 24 of these eggs selected at random, in "digestive juice" at 37°C. when 14 had hatched partly or completely and another was active but had not hatched. The sites of the ova were many including bedding, tub, basin, toilet seat, and children's toys and outer play garments, and a trichuris egg was collected from the middle moulding of a bedroom door. [Presumably it too was airborne.] C. L.

HAMBURGER (Franz) Die Oxyurenneurose [Neurosis from Thread worms].—*Med Klin* 1939 Mar 24 Vol. 35 No. 12 (1787) pp. 369-370

Threadworm infection is usually harmless and to subject a child to measures for prevention which continually draw attention to the condition is to produce neurosis in both mother and child. The best procedure is to treat pruritus if present by a simple ointment, and to give garlic enemata and small doses of santonin but the latter treatments should not be continued for more than a day or two at a time. C. L.

WRIGHT (Willard H.) BOZICEVICH (John) & GORDON (Leon S.) Studies on Oxyuriasis. VII. Clinical Improvement following Treatment with Single Doses of Tetrachlorethylene.—*Amer J Trop Med* 1939 Sept. Vol. 18 No. 5 pp. 609-617

Among 50 boys of school age treated for oxyuriasis with single doses of tetrachlorethylene clinical improvement occurred in a number of cases as indicated by gains in weight, amelioration of certain symptoms and changes for the better in social attitude and scholastic standing.

The need for detailed studies concerning the clinical features of oxyuriasis is pointed out, since in this regard there appears to be a dearth of reliable data based on adequate surveys of a sufficient number of cases.

C. L.

HALL (Maurice C.) Three Parasites which Habitually Surmount our Sanitary Barriers.—*Livro Jubilar do Prof. L. Tréassos*. Rio de Janeiro 1938 pp. 195-211 [16 refs.]

The three parasites are *Trichinella spiralis*, *Enterobius vermicularis* and *Entamoeba histolytica*. So long as this trio can override the barriers we have set up for our protection, so long will it be evident that we do not yet have the requisite knowledge, ability or desire to protect ourselves from these pathogens.

Trichinosis.—Recent autopsies on a large scale have shown that in man the incidence of this infection in the United States lies between 10 and 20 per cent. that in swine it is not less than it was 40 years ago that man gets his infection from swine and that swine get theirs from other swine through giving them to eat raw material which in a poorer country would be cooked and eaten by man. Press warnings have proved useless: people will not sterilize pork by proper cooking and it is felt that the most likely means of betterment is through the packers (the purchasers of swine-growers' products) by an insistence that what they buy shall meet certain reasonable specifications. The

present state of affairs has essentially come about as the result of political and economic conditions based on international trade

Enterobius infection—Stress is laid on its prevalence in Washington amounting to 35 per cent of the general population as disclosed by anal scraping (done often on one occasion only by the N I H swab) and on the way in which the eggs when dried and no longer sticky will fall off the body, sift through clothing and be widely dropped on floors chairs carpets, at home and in streets churches playgrounds shops and elsewhere and will even be carried by air As they are not except by accident faecal constituents they are not prevented from spreading by the ordinary sanitary measures which limit ordinary intestinal parasites Treatment is likely to be the only effective means of combat and some work indicates that the use of a suitable anthelmintic 3 times a day over a period of 10 days will do much to defeat pinworms [see WRIGHT and BRADY this *Bulletin* 1939 Vol. 36 p 329] while the thorough use of a vacuum cleaner will perhaps be of considerable value

Entamoeba histolytica apparently surmounts sanitary barriers by a residuum of cysts remaining about the anus and being passed on by means of food handlers, swimming pools underwear bedding towels washrags and other objects. C L

HOOD (Marion) & OLSON (S W) Trichinosis in the Chicago Area.—*Amer Jl Hyg* 1939 Mar Vol 29 No 2 Sect D pp. 51-56 [19 refs]

Numerous publications indicate that the average incidence of trichinosis in the United States is approximately 13 per cent As no survey had been made in the Chicago area a series of 428 autopsy cases was studied

The material was obtained from unselected autopsies performed at several Chicago hospitals When both the digestion and pressed muscle methods were employed 16 per cent. of the diaphragms were found infected with the larvae of *Trichinella spiralis* These results are in accord with those found in surveys from other localities.

Of the 428 samples investigated 48 were from infants under 1 year of age Four (8.3 per cent.) of these contained trichina larvae

A method is suggested for a more rapid means of investigation in surveys for *Trichinella spiralis* C L

BOZICEVICH (John) Studies on Trichinosis XII The Preparation and Use of an Improved Trichina Antigen—*Public Health Rep* 1938 Dec. 2. Vol 53 No 48 pp 2130-2138 With 1 fig [Summary appears also in *Bulletin of Hygiene*]

The antigens which have been used have been prepared in various ways and probably are not of equal value. In the method described the *Trichinella* larvae prepared from digested infected meat are obtained with a minimum of debris and special care is taken to obtain them free from proteins The dried ground larvae are extracted with neutral 0.85 per cent. solution of sodium chloride No preservative is used in making the antigen but the vials are subjected to fractional sterilization It shows no loss of titre after six months even in sunlight at room temperature By means of precipitin and intradermal tests it was found superior to antigens prepared by other methods It was used for both precipitin and intradermal tests in an outbreak of 44 cases of trichiniasis and all the patients ultimately reacted positively.

to both tests. A method is described and recommended for performing the intradermal test and a procedure for measuring the reaction.

W G Savage

McNAUGHT (James B) The Diagnosis of Trichinosis.—*Amer J. Trop Med* 1939 Mar Vol 19 No 2 pp 181-192. With 5 figs [15 refs]

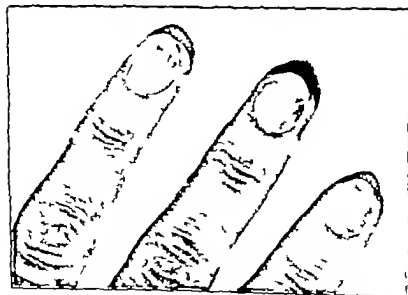
1 While morbidity statistics indicate that less than 3 people per 100 000 suffer from trichinosis annually the examination of cadavers proves that about 400 people per 100 000 are infected annually. It is therefore evident that physicians are not so skilful in recognising this infection as they are in diagnosing many other diseases.

2 The number of parasites ingested, the physical condition of the patient and the specific tissues most heavily invaded must play important rôles in the severity of trichinosis infection.

3 Attention is called to the splinter hemorrhages seen beneath the nails of patients during the migrating stage of trichinosis.

4 The finding of parasites in blood, bile stool, cerebrospinal fluid or biopsy is possible but the diagnosis may be made without recovering the parasites from the patient. Eosinophilia is the most useful clue. Skin and precipitin tests establish that the eosinophilia is due to trichinella invasion rather than to some other cause.

A reproduced photograph shows two finger nails with "splinter hemorrhages" which Drs BIGGS and BRUCK informed McNaught they have found under finger and toe nails in 60 to 70 per cent of persons while in the active stage of infection, a sign which they believe to have been unrecorded hitherto. A photograph of a squash preparation from a sausage shows how heavily these may be infected.



Photograph showing splinter hemorrhages beneath the nails of a patient with trichinosis.

[Reproduced from the *American Journal of Tropical Medicine*]

VAN SOMEREN (Vernon D) The Bone Marrow in Trichinosis of the Rat.—*Jl Helminthology* 1939 Jan. Vol. 17 No 1 pp 13-20
With 8 figs on 2 plates.

Eight rats were each infected with 500-600 encysted *Trichinella* larvae. The changes in the marrow of the femur are reported at from 13 to 45 days after the infection (that is during the acute stage) and at 90 days (that is after recovery).

After such a dose of larvae the percentage of eosinophils in the blood rose to 70 or 80 two to four days after infection. It then fell to 45 to 50 for a considerable time (the rat normal is 30 to 35). From one femur the red marrow which it normally contains was spread as a smear, the other femur after decalcification was cut in sections 10 μ thick. The normal bone marrow of the rat is described. In two controls blood counts were made frequently and in all infected rats immediately before killing them. In the acute stage there is functional myeloid hyperplasia at the periphery and ends of the marrow; the percentage of normal mature marrow neutrophils is lowered, they probably being liberated into the blood; basophils and basophile myelocytes are fewer; formed eosinophils of the ring nuclear type are generally more numerous than myelocytes. The differential blood and marrow counts varied in each rat.

After recovery there were two different pictures—first a persistent low grade blood eosinophilia with the marrow still showing the effect of stimulation; second a blood count with abnormally high neutrophils and normal eosinophil count; a marrow hyperplastic but with the ratio of mature neutrophils to myelocytes inverted, and in the smear a great number of nuclear ring forms. The changes are not directly related to the severity of the muscle infection. C L

VAN SOMEREN (Vernon D) The Treatment of Trichinosis. A Review of Methods.—*Brit Med Jl* 1939 Feb 25 pp 376-381
[67 refs.]

The clinical and symptomatic treatment of trichinosis is briefly discussed and measures for the destruction of the parasite in the host are reviewed. Radium irradiation and catharsis appear to be of no practical value. The use of convalescent antiserum to control the toxic features of the disease should be tried if such serum could be made readily available.

Most chemotherapeutic measures involving the use of anthelmintics, antiseptics, disinfectants and related substances, organic arsenicals and similar substances and certain miscellaneous drugs have been shown experimentally to be of no value and perhaps dangerous. There is experimental evidence, however, that the subcutaneous injection in olive oil or gum arabic of a suspension of the commercial thymol preparation carvasept or the oral administration of butolan (Bayer) (carbamic acid ester of *p*-oxy-diphenyl methane) is lethal to a certain proportion of reproductive adults in rats and their use results in a lessening in severity of the muscle invasion. A clinical trial of butolan should be made.

Excellent results have followed the intravenous administration of 5 c.cm. of gluco-calcium (Lilly) during the hitherto intractable acute migratory phase; this form of therapy should be given further clinical and experimental trials.

Experiments with rats, rabbits, and cats have shown that calcification after encystment may be considerably hastened by the administration of some vitamin D-containing substance supplemented by a supply of calcium in the form of a bland organic salt, thus protecting the host from toxic effects following encystment. Though a warning has been given

that this treatment may result in a dangerous metastatic calcification of other organs, a further judicious clinical trial should be made. It should be noted, however that this treatment is of no value before encystment of the larvae—that is, before four to five weeks have elapsed after infection.

MACIT ARIF Un cas de distomatose humaine à *Fasciola hepatica* et trois cas d'anguilluloses à Zonguldak (Turquie) [One Infection with *F. hepatica* and Three with *Strongyloides* at Zonguldak, Turkey]—*Rev Méd et Hyg Trop* 1938. Nov-Dec. Vol 30 No 6 pp 346-350

Strongyloides it is said, has not hitherto been reported from Turkey while *F. hepatica* has been recorded twice before in man

C L.

FOSTER (A O) & JOHNSON (C M.) An Explanation for the Occurrence of *Capillaria hepatica* Ova in Human Faeces suggested by the Finding of Three New Hosts used as Food.—*Trans Roy Soc Trop Med & Hyg* 1939 Feb 28 Vol 32 No 3 pp 639-644 With 2 figs [25 refs.]

When *Capillaria* eggs are found in the faeces of man, they have been ingested with his food.

Capillaria hepatica is a tissue parasite of the liver usually of that of a rodent, the eggs are laid in the tissue of that organ and do not reach the exterior while the host is alive. After the host's death they are either freed by the decomposition of the host's body and may then be distributed by flies or some other animal eats the infected liver. On one occasion they have actually parasitized man [MACARTHUR, this Bulletin 1924 Vol 21 p 963] but ordinarily the finding of eggs in man's stool has been attributed to their having been swallowed, man having eaten rat or dog for the dog too is an efficient host. But several cases have been reported from Panama and those who live there do not eat rat or dog but they do eat the white-tipped peccary *Tayassu pecari spiridens* the red spider monkey *Ateles geoffroyi* and the white faced monkey *Cebus capucinus imitator*—and in all of these animals the writers found *C. hepatica*. Moreover these eggs are not visibly altered on cooking and on feeding infected, boiled peccary liver to monkeys and cats the eggs were found in these animals' faeces. And the Panamanians customarily cook their meats very thoroughly

C L.

VENOMS AND ANTIVENENES

Précis of Abstracts in this Section

BORMANN (p 853) describes some of the commoner snakes of the Cameroons and the effects of their venoms. PAULI MAGNUS (p 853) comments on this and records a case showing the rapidly toxic effect of bites by *Naja melanoleuca* and the need for the early administration of antivenene. MARTIN DEL CAMPO (p 853) reports that he found in the north-west of Guatemala two species of *Bothrops* new to Mexico.

Madame PHISALEX (p 854) calls attention to the fact already well known that the yellow venom of *Isoperon aspis* is necrosing and neurotoxic in action but some specimens produce a colourless venom

South Africa. Their Unit is ten times the amount needed to neutralize one m.l.d. for mice and is contained in a fixed volume. They suggest that commercial antivenenes be tested against this standard and the dose regulated accordingly. IPSEN (p. 861) remarks that standardization of antivenenes demands preliminary standardization of venoms and since different individuals of the same species produce venom of different strengths (see VELLARD above) and even the same individual does not produce at all times the same strength venom as many samples as possible should be collected to obtain an average. For assaying antivenenes he finds the intravenous test in mice (Zagreb method) the most satisfactory. BOQUET (p. 862) adds further support to Calmette's view that antivenenes are not so specific as most people are inclined to believe. Apart from the specific elements there are group elements (paraspecific the author calls them) common to several venoms and this fact should be borne in mind when preparing and employing antivenenes.

D'ARREU (p. 862) reports a case of recovery after a bite by a krait. It is probable that the patient did not receive the full dose of venom the onset of symptoms was delayed for some hours and antivenene was not administered till 23 hours had elapsed. From description of a case of *Diploides typus* bite (Green Tree snake) in the Cameroons, reported by KRAEZE (p. 863) the venom resembles that of the *Lachesis* genus of South America. In the instance reported, the symptoms were mainly local with considerable resultant anaemia, but recovery ensued without specific antivenene, though 10 cc. of anti-cobra serum were given. ALLEN (p. 863) points out the advantages of the Jackson method of treatment of snake-bite—incision followed by suction—over local chemical injections.

Scorpions.—SERGENT (p. 864) describes and illustrates the scorpions of northern Africa and details cases of scorpion sting in Algeria where deaths from this cause are not very rare. He points out the value of antivenene when given early and in fairly large doses. KENT & STAHNKE (p. 865) writing of the species found in Arizona note the seriousness of stings by *Centruroides sculpturatus* which in children particularly are not infrequently fatal after convulsive attacks and signs of respiratory distress. Attention is called by VARELA (p. 865) to the effect of calcium chloride in cases of stinging by another species of the same genus, *Centruroides limpidus* but from his account it would appear to do little more than delay death in animals on which this treatment was tested. DE MAGALHÃES (p. 866) gives a general account of the common scorpions of Minas Geraes and the symptoms produced by their venoms. In a further paper he describes more fully their neurotoxic action.

Whereas (see above CÉSARI) certain snake venoms have their toxicity attenuated by addition of formaldehyde without reduction of their antigenicity in the case of scorpion venom VARELA & SÁNCHEZ POSADA (p. 866) show that both properties are destroyed thereby.

FINLAYSON (p. 867) relates his researches on the venom of *Latrodectus indistinctus* its thermostability the effects on it of chemicals such as gold chloride potassium permanganate and formalin and the haemolytic properties of the venom itself and of an emulsion of the dried insect. With his co-workers he shows (p. 867) that the venom has a depressant action on heart muscle. It probably contains more than one toxic principle and some of its effects may be due to the release of a histamine-like substance in the tissues. MACKINNON (p. 868)

VOX KLOBUKITZKY (D) & HOSIO (P) Biochemische Studien ueber die Gifte der Schlangengattung Bothrops. VI. Mitteilung Kurzer Bericht ueber verschiedene in den Jahren 1936-37 gewonnene Versuchsergebnisse [Biochemical Studies of the Venom of Bothrops. VI Short Report on Various Findings during 1936-37]—*Arch f Experim Path u Pharm* 1939 May 10 Vol 192 No 3 pp 71-75 With 1 fig

PRUSALTY (Marie) Le venin blanc des vipères du département du Gers est depourvu de pouvoir vaccinant [The Colourless Venom of the Vipers of Gers has no Vaccinating Power]—*C R Acad Sci* 1939 Apr 17 Vol 208 No 16 pp. 1252-1254

Specimens of *Vipera aspis* from certain districts had previously been found to provide colourless venom instead of the usual yellow and this is more neurotoxic and less necrosing than the yellow and is completely neutralized by anti viper serum. Yellow viper venom loses its antigen and becomes more toxic on account of this loss, when subjected to short wave radiations for 30 minutes.

Tests of the colourless venom (which has maximum toxicity in summer) were made on mice. The venom was divided into two portions, one of which was heated to 75 C. for 15 minutes to destroy toxicity. This was used for vaccination and 48 hours afterwards rather more than 1 ml d. was injected into each animal. In all cases, with venom collected in spring, summer and autumn, no evidence of protection was seen.

This colourless venom therefore has no protective power. It provokes neither necrotic nor haemorrhagic reaction but is simplified practically to a neurotoxin. C IV

PEREZ (Francesco) Ulteriori ricerche sugli ofidi velenosi dell' A.O.L. [Recent Work on the Poisonous Snakes of Italian East Africa.]—*Boll Istituto Sieroterap Milanese* 1939 Jan Vol 18 No 1 pp 1-8 With 4 figs. on 2 plates [16 refs.] French summary (7 lines)

The author studied the venom of *Atractaspis microlepidota* Magretti obtained from the dried gland, which is a long delicate structure (up to 30 cm. in length) with an ampulla close to the base of the fang. The venom has a powerful toxic action, about twice as strong as that of *Vipera ammodytes* and may be lethal to man, especially if introduced into a vein by the long slender fangs. In animals respiration is paralysed, the venom being rich in neurotoxin and poor in enzymes. Haemolysis and coagulation of citrated plasma are not produced *in vitro*.

Two monovalent sera neutralize this venom, that prepared against *V. nigricollis* and that against *V. ammodytes*. Polyvalent antivenene contains the former and it is unnecessary to prepare serum directly against *A. microlepidota*.

Psemmophis sibilans was also studied and although its venom possesses neurotoxic properties, the small quantities available in the glands and smallness of the fangs, set far back, render this snake comparatively harmless to man. C IV

obtained in a homogeneous or crystalline state it can be concentrated tenfold. The authors believe that the proteolytic and coagulating activities are due to the same protein, which, when highly purified shows the properties of an albumin.

The neurotoxic principle can be obtained pure and is the first proteinic toxin which has so far been crystallized. It contains the whole neurotoxic and haemolytic activities of the venom, which have hitherto been attributed to two different substances. The authors name this substance crotoxin. It contains 4.0 per cent. of sulphur and the molecular proportion of methionine to cystine is exactly 1 : 6

C IV

GHOSH (B. N.) & DE (S. S.) Proteins of Rattlesnake Venom. [Correspondence]—*Nature*. 1939 Mar 4 Vol. 143 No 3616 pp 390-391

By dissolving 100 mgm. of venom of *Crotalus terrificus* in 10 cc. water adjusting to pH 7.0-7.2, saturating with sodium chloride overnight at 6°C., separating the precipitate by centrifugation, and washing again in saturated sodium chloride the authors found the precipitate to contain 8-10 per cent. of the total haemolytic activity and only 2-2.5 per cent. of the total neurotoxic activity of the original venom. This proportion of 4 : 1 between the two is much higher than in the original venom and the two activities are therefore due to two different substances. The crystalline substance obtained by SLOTTA and FRAENKEL-COVAT [see above] was therefore a mixture of at least two different proteins.

Similarly the haemolysin and neurotoxin of *Naja naja* venom have been separated

C IV

VELLARD (J.) Propriétés du venin des principales espèces de serpents du Venezuela [The Properties of the Venom of the Principal Snakes of Venezuela.]—*Ann Inst Pasteur* 1938 May Vol 60 No. 5 pp 511-548

Following his previous work in which he described differences existing between the venoms of specimens of *Bothrops atrox* from different parts of South America [this Bulletin 1937 Vol. 34 p 656] the author has made a study of *Crotalus terrificus*, *Lachesis muta*, *Bothrops atrox*, *Bothrops nasuta* and *Elaps lemniscatus* in the same way. The methods employed were similar to those used previously and the properties of the venoms under the headings of coagulant, anti-coagulant, haemolytic, anti-haemolytic, anti-complementary, proteolytic and necrosing were examined separately *in vitro* and *in vivo*. Determination of the susceptibility of the principal laboratory animals was made.

The venoms of *L. muta* and *B. nasuta* were constant in all the specimens examined, such differences as were found were entirely quantitative and could be accounted for by individual variations. The results with the venom of *E. lemniscatus* though indicating that differences were not appreciable, could not be regarded as conclusive on account of the small quantities available for testing. The venoms of *C. terrificus* and *B. atrox* however showed clear differences between the specimens from different parts.

toxic factor and the spreading factor are neutralized by specific antiserum *in vitro* as well as *in vivo*

Little or no spreading factor was found in toad venom though this is extremely poisonous for both the circulatory and the nervous system. Extracts of non poisonous insects, e.g. crickets grasshoppers dragon flies etc. did not contain it, but it was found in extracts of bees, wasps mosquitoes and especially spiders

It would appear in the case of snakes, that a relationship exists between the local tissue action and the spreading factor content and the author likens the rattlesnake venom, containing the factor to *Clostridium welchii* and the toad venom to *Cl. tetani*

An interesting point is that extracts of the cells of the poison gland of the rattlesnake contain very little toxin or spreading factor but that both are present in the secretion of the gland [The work of CASTELLANI this Bulletin 1839 Vol 38 p 567 may have some bearing on this point] C II

FAYILLI (G) I fattori di diffusione o ro natura meccanismo d'azione significato [Spreading Factors their Nature, Mode of Action and Significance].—*Boll Istituto Sieroterap Milanese* 1838 Nov Vol 17 No 11 pp 711-714 German summary (5 lines)

A physiological solution injected into the skin behaves like liquid dropped on writing paper if it contains the spreading factor it behaves like liquid dropped on blotting paper

Tumours are especially rich in spreading factor and it is contained in various organs. The intensely rapid action of snake venom is due to it. The diffusion of scorpion venom is so rapid that if injected into the skin in a dilution of 1 in 100 000 no bleb is formed and dispersion is immediate

Antivenene neutralizes but in an incomplete manner the spreading factor of the homologous venom. Anti-viper serum, however does not neutralize the factor in crutaline or in cobra venom. The spreading factor is antigenic and specific. A spreading factor is present in certain micro-organisms (staphylococci streptococci pneumococci) and in the exotoxins of the gas gangrene group but cannot be identified with the endo- or exotoxins. The existence of a single uniform factor in venoms cannot be substantiated. The factors have been considered to be proteins but the author has succeeded in partially separating them from the proteins in the case of the testicular factor. They resist drying

The factors act only on collagenous connective tissue and probably therefore on the capillaries and lymphatics, and exert an influence on the exchange between connective tissue and the capillaries and lymphatics C II

VELLARD (Jehan) Variations de la résistance globulaire *in vivo* sous l'influence des venins de serpent. [Variations in Red Cell Resistance under the Influence of Venom *in vivo*].—*C. R. Acad Sci* 1839 Feb 27 Vol 208 No 9 pp 669-671

A distinction must be made between resistance to venom haemolysins and resistance to mechanical action or hypotonic solutions. Coagulant and non-coagulant venoms have different effects.

CÉSARI (E.) & BOQUET (Paul) Sur le mécanisme de la détoxication du venin de *Vipera aspis* par l'aldéhyde formique. [The Mechanism of the Detoxication of the Venom of *V. aspis* by Formaldehyde.]—*C R Soc Biol* 1939 Vol. 130 No. 1 pp. 19-23

It has been shown [this *Bulletin* 1931 Vol. 28 p. 549 1934 Vol. 31 p. 103] that the addition of 3 to 10 parts per thousand of formaldehyde to snake venom causes, in a few weeks, attenuation of the toxic action without alteration of antigenic power. The authors have studied this effect with reference to the components of the venom of *V. aspis*. They added 2, 4 and 6 parts per 1 000 of 40 per cent. formaldehyde to solutions of 10 mgm. venom per cc. physiological saline. This mixture was incubated at 37°C. and tested at intervals on rabbits, guinea-pigs, citrated plasma and washed horse erythrocytes in the presence of normal horse serum. Results were compared with those obtained with pure venom.

Toxicity was attenuated very rapidly in 24-48 hours, especially with 6 per 1 000 formaldehyde, when tested by intravenous injection in rabbits, more slowly when tested subcutaneously in mice and guinea-pigs (2 weeks). Coagulation was completely inhibited at 48 hours with 6 per 1 000 and at 72 hours with 4 per 1 000. Haemolytic power however was only slightly affected after 15 days by 6 per 1 000. The action of formaldehyde is therefore selective. C IV

BOQUET (Paul) Sur le rôle du cuivre dans l'atténuation du venin de vipère (*Vipera aspis*) par l'eau oxygénée. [The Role of Copper in the Attenuation of the Venom of *V. aspis* by Hydrogen Peroxide.]—*C R Acad Sci* 1939 Mar. 6 Vol. 203, No. 10 pp. 770-772

A solution of viperine venom (1 in 500) in distilled water mixed with an equal quantity of hydrogen peroxide (100 volumes diluted 1/100, 1/200 etc.) and kept for 20 hours at 37°C. is harmless to rabbits in 5 times the normal lethal dose. The hydrogen peroxide was prepared with the same distilled water in which traces of copper from the still were found. On substituting water distilled from a glass still there was no attenuation of the venom but when 1 mgm. per litre of copper sulphate was added, attenuation was again produced. No attenuation was found with copper in the absence of hydrogen peroxide.

The copper probably acts as a catalyst in fixing the oxygen and the experiment shows with what care reagents must be prepared.

C IV

BOQUET (Paul) Sur le rôle de quantités infinitésimales de cuivre dans l'atténuation du venin de vipère (*Vipera aspis*) par l'eau oxygénée. [The Role of Small Quantities of Copper in the Attenuation of the Venom of *Vipera aspis*.]—*C R. Soc Biol* 1939 Vol. 131 No. 15 pp. 7-10

In continuation of the experiments in the preceding paper the author found that when a solution of the venom was mixed with hydrogen peroxide in different amounts and with a solution of 1 mgm. to the litre of copper sulphate the toxicity decreased in proportion to the concentration of H_2O_2 , and to the length of time of contact with the reagents. Control mixtures without copper remained toxic for much

The author advises that sera should be marked according to the venoms used in preparation, since there are well marked geographical localizations of the various species in Europe. He suggests that the mouse intravenous test should be used rather than tests on rabbits.

C IV

BOULET (Paul) Immunité antivenimeuse spécifique et paraspécifique. [Specific and Paraspécific Immunity against Venoms.]—*Rev d'Immunologie* Paris. 1938. Juh. Vol 4 No. 4 pp. 359-370 [26 refs.]

Recent researches have supported the opinion expressed by CALMETTE that the specific nature of antivenenes is not so strict as was thought. CÉSARI and the author have shown that a bivalent serum prepared against *B arictans* and *S haemachates* (neither of which contains a coagulant principle) can neutralize *in vivo* and *in vitro* the coagulating effect of the venoms of *L russells*, *C cornutus* and *L aspis* but has almost no action against the coagulating principle of *C terrificus* and *B atrox*. It also protects against the anticoagulating principles of *B arictans*, *S haemachates*, *N flava* and *N tripudians*. The venom of *L lebetinus* of Africa is better neutralized by anticobra than ant viper serum.

The paraspecific action of serum seems to result from antibodies capable of combining with group antigens, but, as VELLARD [see this Bulletin 1937 Vol 34 p. 656] has pointed out, members of the same species but from different districts elaborate different antigens. In spite of this however members of different species elaborate certain antigens which are identical, and which have strictly specialized properties. These common antigens are the group antigens, and should be taken into account in the preparation of antivenenes [this Bulletin 1937 Vol 34 pp. 641-646] by making use of those venoms which contain the antigens most commonly found in the district in which the serum is to be used.

The author makes a plea for uniformity in methods of titration and systems of units. A useful table of the actions of common venoms is given.

C IV

D'ARREU (A. R.) Poisoning by Bite from *Bungarus caeruleus* with Recovery.—*Indian Med. Gaz.* 1939. Feb. Vol 74 No. 2, pp. 84-85.

The patient a juggler who used snakes in his acts but who could not distinguish between the poisonous and non-poisonous kinds, picked up what he later identified as a krait (*Bungarus caeruleus*) which bit him in the hypothenar eminence. He sucked the wound and ligatured his wrist. No effects were felt for some hours but 13 hours after the bite he was admitted to hospital with fully developed symptoms of colubrine venom poisoning. Anti-serum C (Pasteur Institute of Paris) labelled as specific against the venoms of *Naja* and *Bungarus* snakes was given intravenously about 23 hours after the bite (it was not available earlier). Cyanosis and respiratory paresis with salivation, indistinct speech ptosis paresis of the limbs diminished tendon reflexes (but no loss of tactile sensation) and great prostration were found, but there was no local reaction. Signs of pneumonic

consolidation appeared but rapidly cleared and the patient recovered slowly at first

The amount of venom available in the krait is about three lethal doses for man but possibly the thick epidermis of the palm of the hand prevented effective penetration by the small and fine fangs which are also in some instances not completely tubular and may thus permit escape of the venom. Recovery from the bite of the krait is rare C IV

KNABE (Kurt) Schlangenhiss eines Kamerunnegers durch grüne Baumschlange (*Dipholidus typus*) [The Bite of the Green Tree Snake (*Dipholidus typus*)]—*Arch f Schiff- u Trop-Hyg* 1939 Apr Vol. 43 No 4 pp 173-174

The symptoms in a native in the Cameroons bitten by this snake were swelling of the bitten hand and arm, pain vomiting rapid and weak pulse and headache. Bleeding continued for some days from an incision made at the site of the bite and haemorrhagic necrosis of the edges took place. Ecchymoses appeared in the mouth but no blood was found in the vomit or stool. Erythrocytes diminished to 2-6 millions and haemoglobin to 30 per cent.

Treatment was symptomatic but in the absence of specific antiserum 10 cc. anti-cobra serum was given. The patient was very ill for about a week when improvement started.

The effect of the venom is comparable with that of the South American snakes of the genus *Lachesis* and death results from vasomotor paralysis and haemorrhages in the internal organs due to lysis of the capillary walls by a toxic haemorrhagin. C IV

ALLEN (Frederick M) Mechanical Treatment of Venomous Bites and Wounds.—*Southern Med J* 1938. Dec. Vol. 31 No 12. pp 1248-1253 [14 refs]

The author states that all authorities are agreed as to the uselessness and actual harmfulness of the injection of permanganate and all other chemical solutions designed to destroy or neutralize venom. There is no method of occlusive ligation which affords the slightest protection or benefit against venom in animal experiments. Successive tight ligations and releases are effective if a rapidly absorbed poison such as strychnine is injected but are useless for snake venom which is usually absorbed slowly.

The Jackson treatment [see this *Bulletin* 1929 Vol. 26 p 273] consists in the use of a very lightly applied tourniquet just enough to obstruct the lymph circulation and not the free venous return. Under local anaesthesia a rather large crucial incision is made at the site of the fang marks, and a ring of smaller cross incisions about $\frac{1}{4}$ inch wide by $\frac{1}{4}$ inch deep is made round the advancing edge of the swelling. Suction over these with a special form of cup is employed to draw out large quantities of fluid, and the flow is further increased by the injection of several hundred cc of 1 per cent salt solution into the incisions. Suction is continued for half to one hour then repeated for 20 minutes hourly for 10 to 15 hours.

This treatment has been successful in experimental work with dogs and the fluid removed by the suction has been shown to be fatal to

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This treatment has been successful in experimental work with dogs, and the fluid removed by the suction has been shown to be fatal to

other dogs. It is perhaps best adapted to the venoms with powerful local action.

This treatment is simple and should be used even if antivenene is available, and certainly if it is not. Excision is only useful if considerable in extent. Amputation may be necessary and the use of an occlusive tourniquet should be reserved for control of haemorrhage for gaining time preliminary to amputation or for use with local refrigeration, another method of gaining time.

The author considers that Jackson's method deserves a thorough trial in the tropics. C IV

SERGEANT (Etienne) Iconographie des scorpions de l'Afrique du Nord. [Iconography of North African Scorpions].—Arch. Inst. Pasteur d'Algérie 1938. Dec. Vol. 16. No. 4 pp. 513-522. With 5 coloured plates

The differentiation of species of scorpions by colour characteristics is of considerable importance and this cannot be effected by monochrome photographs. Illustrations in colour are therefore here reproduced of *Prioxurus australis* (adult and young) *P. liouvillei*, *Buthus occitanus* and *Heterometrus maurus* together with brief notes concerning toxicity and habitat. [The coloured plates are beautifully executed and reproduced] C IV

SERGEANT (Etienne) Venin de scorpion et sérum anti-scorpionique. [Scorpion Venom and Antivenene].—Arch. Inst. Pasteur d'Algérie 1938. Sept. Vol. 16. No. 3 pp. 257-278

The author gives the details of 12 cases of fatal scorpion sting in Algeria and Morocco. In Algeria the dangerous scorpion is *Prioxurus australis* in Morocco *P. liouvillei* and one person died from the sting of the usually harmless *Buthus occitanus*.

Serious symptoms do not usually appear until two hours after the sting. They consist of violent pain, vomiting, vertigo, profuse sweating and sensation of cold, cardiac weakness, dyspnoea, cyanosis and coma.

Serum is prepared from horses and donkeys, and should be given as soon as possible in doses of from 10 to 50 cc. for adults. [The dose advised for children is not given but in 8 children detailed it varied from 10 to 50 cc. These children all died. Does the rule that the smaller the animal the larger should be the dose hold good for scorpion antivenene?]

In 33 patients whose condition was regarded as desperate, 26 were saved by serum. In 8 in whom the serum was injected soon after the sting there were no deaths. In 68 with definite but not grave symptoms there were no deaths. At Bou Saâda in 1932-1934 when no serum was available there were 22 deaths. In 1936 and 1937 when serum was used there was 1 death in 32 stung. At El Kantara from 1929 to 1935 when serum was not available, there were 12 deaths. In 1936 and 1937 when serum was used, there were no deaths in 51 stung, 14 of whom had grave symptoms.

Animals immunized against *P. australis* are protected against other North African species [see also this Bulletin 1937 Vol. 34 p. 727]

PALLARY (Paul) Sur des scorpions de la Berbérie de la Syrie et du Congo. [Scorpions of Northern Africa, Syria and the Congo]—*Arch Inst Pasteur d'Algérie* 1938 Sept. Vol 16 No 3. pp 279-282.

KENT (Melvin L.) & STAHKE (Herbert L.) Effect and Treatment of Arizona Scorpion Stings—*Southwestern Med* 1939 Apr Vol 23 No 4 pp 120-121 124

More deaths have resulted from scorpion stings in Arizona since 1929 than from any other venomous animal. The effects of the stings of *Leiurus spinigerus*, *Hadrurus hirsutus* and *Centruroides sculpturatus* on rats were studied the two former being relatively harmless the last being fatal. In man the effects of the sting of *C. sculpturatus* are invariably more pronounced in children than in adults and are almost always fatal to those under 1 year of age. The child cries out with pain but there is little sign of the sting. Restlessness follows with rigidity of the abdominal muscles tonic contractions of arms and legs and salivation. Temperature may reach 104 F. Cyanosis and difficulty of respiration involuntary urination and defaecation may follow and death supervene apparently from exhaustion. If recovery takes place there is numbness at the site of the sting and possibly temporary uselessness of the limb.

In treatment barbiturates and bromides the latter in large doses are valuable but morphine should be used only with extreme caution and has not been found useful in the usual dosage. Atropine may be given for severe pulmonary oedema and compresses of fairly strong ammonium hydroxide solution are useful if applied within a few minutes of the sting. Results with scorpion serum are encouraging and the author believes that no death has occurred when it has been used. One case is quoted in which the serum produced dramatic improvement within a few minutes of intramuscular administration.

C IV

VARELA (Gerardo) El cloruro de calcio en la intoxicación por la toxina del alacrán de Guerrero (*Centruroides limpidus* Karsch) Calcium Chloride in Scorpion Poisoning]—*An. Escuela Nac. Ciencias Biol. Mexico* 1938 Oct.-Nov.-Dec. Vol. 1 No 1 pp 133-134 English summary (2 lines)

Mice of 18 to 20 gm. tolerate the injection of 0.0187 gm. calcium chloride and this dose was mixed with the m.l.d. (0.0028 gm.) of the toxin of *Centruroides limpidus* Karsch and injected. Death occurred in some of the animals but much less early than in the controls. Similarly mice given calcium chloride after the appearance of symptoms following the administration of the m.l.d. of scorpion venom died, but much later than the controls. In the treated animals death was delayed up to the following day controls died in about 30 minutes.

Calcium chloride may therefore be useful in the treatment of sublethal scorpion poisoning. [No figures are given.]

C IV

DE MAGALHÃES (Octavio) Scorpionism.—*Jl Trop Med & Hyg* 1938 Dec. 15 Vol. 41 No. 24 pp 393-399 With 1 chart & 1 fig

The common scorpions of Minas Geraes are *Tityus bahiensis* and *T. serrulatus*. The venom can be kept dry at 0 C. for eight months with the loss of only half to quarter of its value.

The author gives three general laws. 1 The poison is toxic to the nervous system. 2 An animal is only absolutely immune when its central nervous system is immune. 3 The poison affects principally the neurones united in centres. But in the poison there are also haemorrhagins leucocytolytins agglutinins and haemolysins. The symptoms exhibited depend upon the dose and its proportion to the weight of the patient the kind of scorpion and the time of the year toxicity being greater in August September and October than at other times. The resemblance of the symptoms to those of acute syringobulbia is emphasized. The long account of the symptomatology given should be read in the original.

In Brazil 6,668 cases of scorpion poisoning are reported of which 237 were fatal. The author mentions a local treatment with the juice of the leaves or tubercle of the dahlia, which has some neutralizing action but serotherapy is the only effective measure. The deaths in a series [numbers not given] were 1.81 per cent with serum treatment 42 per cent without.

C IV

DE MAGALHÃES (Octavio) The Scorpionic Syndrome.—*Jl Trop Med & Hyg* 1939 Jan 2, Vol 42, No 1 pp 1-5

The venom of specimens of the genus *Tityus* contains especially a neurotoxin which is the killing agent. The author emphasizes the action on the nervous system the characteristic effect of which is an alteration of the superficial sensibility to pain. Painful hyperaesthesiae may be confined to the area of the sting or may radiate along the limb affected and may be exceedingly violent. Numbness itching or pricking sensations may be felt.

The venom of the Brazilian species of *Tityus* has a distinct and constant action upon the neurones of the cerebral cortex of laboratory animals. In man generalized convulsions disturbances of speech delirium and certain states of aggressiveness also indicate an action on the cortical neurones of the frontal lobes. There is an action on the cerebellum and on the medulla oblongata. The author gives a long table comparing the symptoms of severe scorpionism with those of syringobulbia. The resemblance is close. Attention is drawn to the fact that scorpion venom is not primarily of a digestive nature as is the venom of the *Opilidia* in general.

C IV

BARROS (Evandro da Fonseca) Contribuição ao conhecimento de lesões nervosas centrais provocadas pelo eneno escorpionico [Lesions of the Central Nervous System due to Scorpion Venom].—*Mém Inst Biol Espírital Dias* Belo Horizonte 1937 Vol. 1 300 pp With 3 text figs & 125 figs on 66 plates [40 refs.]

VARELA (Gerardo) & SÁNCHEZ POSADA (Enrique) Anaponzonás del veneno del alacrán de Guerrero (*Centruroides limpidus* Karsch) [Detoxification of Scorpion Venom].—*An Escuela Nac Ciencias Biol* Mexico 1938 Oct.-Nov.-Dec Vol. 1 No 1 pp 135-137 English summary (8 lines)

The addition to scorpion venom of formaldehyde (40 per cent.) to a concentration of 4 per cent. renders it non-toxic to mice after 7 days at 37°C. and at the same time deprives it of antigenic properties. Treatment with equal quantity of sodium ricinoleate in a concentration of 1 in 500 does not detoxify the venom as it does that of

V. aspis Lugol's solution in a concentration of 1 in 10 detoxifies scorpion venom in 24 hours in the refrigerator but destroys the antigenic power

The authors therefore recognize a distinction between snake toxins and scorpion venom

C II

FINLAYSON (M. H.) Some Properties of the Venom and Arachnolysin of *L. indistinctus*—*South African Jl Med Sci* 1937 Oct Vol 2. No 4 pp 151-155

Four matters of research were carried out by the author and described in this all too brief paper —

1 The thermostability of the venom of *Latrodectus indistinctus* This was determined by heating the venom for 30 minutes at 50 55° 60 70 and 80°C and injecting it intravenously into mice for which the control m.l.d. was 0.05 mgm Heating to 50°C had little effect at 55°C the venom was weakened and at 60°C totally destroyed.

2. The action of certain chemicals on the venom The toxicity was removed by 0.01 per cent gold chloride or potassium permanganate or of 40 per cent formalin (? formic aldehyde formalin is the name usually given to 40 per cent solution of formaldehyde) Fractionation by means of CO₂ results in a more highly toxic insoluble and less toxic soluble fraction

3 The haemolytic properties of the venom. It was found not to haemolyse human or guineapig's corpuscles even when guineapig serum was added, but it would haemolyse rabbit cells readily sheep cells slightly only

4 The haemolytic properties of arachnolysin that is a solution of the dried body of the insect This differed in several respects from the venom It readily haemolysed human corpuscles and of the rabbit (in this resembling the venom) it would not affect sheep cells unless guineapig serum was added. As for guineapig red cells these were haemolysed by the arachnolysin but not if guineapig serum heated or unheated, was added [see also this *Bulletin* 1937 Vol 34 p 732]

H H S

SHAPIRO (H. A.) SAFEIKA (N.) & FINLAYSON (M. H.) Pharmacological Actions of the Venom of *Latrodectus indistinctus*—*South African Jl Med Sci* 1939 Apr Vol 4 Nos. 1 & 2. pp 10-17 With 8 figs.

Poisoning by the bite of *L. indistinctus* the Knoppie spider is far from uncommon in South Africa [see this *Bulletin* 1937 Vol 34 pp. 732-3] In this article the authors record the results of their experimental work with the venom on the heart respiration intestine and skin of frogs, rabbits and cats It was found to have a depressant effect on the cardiac musculature and since the effect is not abolished by atropine the action is probably directly on the muscle. These depressant cardiac effects are associated with rise in blood pressure which however sinks after 2-3 minutes and there is increase also in intestinal and skin volume suggesting that the crude venom contains more than one toxic principle Some of the effects may be due to a histamine-like substance released in the tissue (as in the case of cobra venom) though none such was detected. The action on respiration is also depressant and death is due to this combined effect on the respiratory and vascular systems.

H H S

MACKINNON (Juan E.) Accidentes poco conocidos producidos por picaduras de arañas Arafismo cutáneo-gangrenoso y hemolítico [Little-known symptoms in bites by *Latrodectus mactans*].—*Arch Uruguayos de Med Ciruj y Especialidades* 1938 Nov Vol 13 No 5 pp 575-580 (16 refs)

The symptoms usually resulting from bites by the Black Widow spider are of a neurotropic nature [see this *Bulletin* 1936 Vol 33 p 401 1937 Vol 34 p 728]. Four cases are recorded here in three of which there was local necrosis and a gangrenous condition produced, in one with jaundice and in the fourth (third in the order described) marked systematic disturbance with haematuria, delirium coma and death in 36 hours this was a boy of 11 years bitten in the right subclavicular region by a spider which was found under his shirt

H H S

SARTH (Donn) & DAMOUR (Fred E.) Black Widow Antivenin Production in Rabbits.—*Proc Soc Experim Biol & Med* 1939 Apr Vol 40 No 4 pp 686-687

Antiserum against the Black Widow spider is usually prepared in the sheep and requires about 3,000 spiders for each animal. Loss of a sheep is therefore a serious matter. The authors attempted the production in rabbits. The venom glands were removed and macerated in saline debris was filtered off through cotton and the rabbits, of about 4 kgm. were immunized by subcutaneous injections on alternate days for the first 2 weeks one quarter of the venom of one spider was given for the next 2 weeks one spider for the next 2 weeks two spiders and for the last 5 weeks eight spiders at each injection.

Serum at the end of the 5th week showed little or no neutralizing power but after 11 weeks the results compared reasonably well with those of sheep serum. This finding may be important in the commercial production of antivenene where only small amounts of readily available serum are desired.

C IV

ASCONA (H L.) Histología de la glándula venenosa de *Cryptidromus bryeri* Becker [Histology of the Poison Gland of *Cryptidromus bryeri* Becker].—*An Escuda Nac Ciencias Biol Mexico* 1938 Oct-Nov Dec Vol 1 No 1 pp 107-112. With 5 figs on 3 plates. English summary (4 lines)

The author describes the anatomy and histology of the spider in considerable detail. There are two types of cells concerned in the production of venom. The first distributed over the membranous wall, consists of cells of about 60 μ in diameter which contain dark granules and glycogen. The cells of the second type distributed on the fibrous trabeculae which extend inwards from the wall, are from 120 to 130 μ in diameter. Nuclei in this type are either absent or pyknotic the cells are pyriform and contain the substance which constitutes the principal part of the venom together with mucin. Some of these cells are apparently in a state of rest others are disintegrating.

The venom of the spider is a mixture of the products of the two types, the first secreting its poison the second disintegrating to produce it.

C IV

SACCHI (P) Immunité active chez le lapin avec le venin des abeilles
 [Active Immunity in Rabbits against Bee Venom.]—*Boll. Sezione
 Ital. Soc. Interna. di Microbiologia* Milan, 1938. Oct Vol 10
 No 10 pp 211-213

Intravenous injection of Apitoxin Smit a solution of the venom of 1 000 bees in 100 cc. saline solution, into mice shows that it possesses paralyzing and haemolytic actions with the production of methaemoglobin. Intradermally it produces necrosis.

Eight rabbits were given 0.2 cc. of this venom subcutaneously and in the same place on alternate days during 20 days. Fifteen days after the last injection they with 6 normal controls were given minimal haemolyzing and necrosing doses and the flocculation test of Ramon was applied. The results of these three tests showed that antitoxic immunity to the extent of about 25 I.U. per cc. of serum had developed in the injected animals and none was found in the controls.

C IV

MISCELLANEOUS

BARDSWELL (A. D.) Tuberculosis in Cyprus (Final Report).—*Tubercle* 1938 Dec Vol. 20 No 3 pp 97-113 With 2 maps (1 folding) & 1 fig. 1939 Jan Vol. 20 No 4 pp 165-193 With 11 figs & 15 charts. (Summary appears also in *Bulletin of Hygiene*)

This is a report on the second and final year's work undertaken by the late Dr Bardswell and on account of the intelligent and careful use of the available methods of investigation provides a very complete confirmation of the opinions expressed in his first report [see *Bull. of Hyg.* 1939 Vol. 14 p 130 this *Bulletin* 1939 Vol. 36 p 342].

An intensive survey was made of the town and district of Larnaca comprising a population of 42 000. The whole school population was tested with tuberculin and positive reactors were followed up into their homes to find the person responsible for the infection. An enquiry was made into every known case of tuberculosis since 1931. Contacts were examined and a systematic study of the death registers was made. As the routine X-ray examination of large numbers of the general population was impossible it would be difficult to suggest more effective measures than were taken.

The many findings cannot be abstracted in full, but the principal conclusions are that tuberculosis is not so common as was thought (the incidence rate in the Larnaca district is about 3 per 1 000 of the population the average death rate 0.69) that it is essentially a disease of families that the Cypriots show high resistance to infection and to the spread of definite disease with chronic fibrous reaction rather than acute caseation and that bovine disease does not occur. It seems probable that some degree of inherited resistance is present and that this is aided by the climate and certain common habits such as that of sleeping out of doors in the summer. There is some experimental evidence that the virulence of the tubercle bacilli is normal.

The standard of living is low but there is no correlation between poverty and tuberculosis incidence and malnutrition is not an important factor. Malaria plays only a small part in the incidence of

tuberculosis. Contact is most effective where the patient (as is usual) sleeps in the same room as the other members of the family but even under these conditions may not produce infection if the beds are far apart. Sleeping away from contacts, even though using the same day time living accommodation greatly decreases the chance of infection.

A mass of information is contained in this report with detailed descriptions of the epidemiological findings and conditions of life and recommendations as to the control of the disease which in their instance upon modifications of existing customs rather than radical alterations which would probably antagonize the people display the wisdom and experience of the author. The untimely death of Dr Bardwell is a severe loss to the cause of tuberculosis but in this report he has left a model upon which future investigations may well be based.

C II

VOGEL (E) & RIQU (M) *Les maladies épidémiques endémiques et sociales dans les colonies françaises pendant l'année 1937* *Maladies sociales Tuberculose* [Epidemic, Endemic and Social Diseases in the French Colonies during 1937 Tuberculosis].—*Ann de Méd et de Pharm Colon* 1939 Apr Vol 37 Supplement. pp 487-506 [Summary appears also in *Bulletin of Hygiene*]

In French West Africa 5 142 cases of tuberculosis were discovered in 1937 compared with only 1 833 in 1936 but the disparity is probably due to the improved services in the dispensaries since the proportion of tuberculosis in the total diseases found has hardly changed. Of the whole 87.6 per cent were cases of pulmonary tuberculosis. Fibro-caceous disease with frequent extensions is common and the patients are often not seen until the stage is advanced. Treatment is difficult but BCG vaccination is regularly carried out by the maternity staffs. In Dakar 1,563 vaccinations were thus performed. The disease is a serious menace in Dakar and the only certain prophylaxis is isolation in hospital but since the natives will not accept hospital treatment until a late stage this is obviously inadequate.

In Equatorial Africa there were 825 cases compared with 1 097 in 1936. In Madagascar there is a special dispensary. Collapse therapy has been given to 59 native patients. In Indo-China the numbers showed an increase to 48,120 and the disease is a great social danger. In Cochun-China there were 14,508 cases and pneumothorax was induced in 213. Other methods of collapse were also tried, and a hospital-sanatorium opened in 1933 has now admitted 388 patients of whom 133 have died. A preventorium for children has been commenced and 27,903 BCG vaccinations given. In Tonking 23 179 cases were found. At Hanoi there is a special dispensary and 13 410 BCG vaccinations were given. In the Pacific and Atlantic groups the numbers are much smaller as are the populations concerned.

Tuberculin testing of representative groups of natives was carried out in a number of places. Some of these results have already been abstracted in the *Bulletin of Hygiene*.

It is evident that the French are taking steps to control what is obviously a serious disease in the empire. It is advised that Europeans suffering from tuberculosis should be repatriated from West Africa for treatment.

C II

WILLIAMS (George D) & APPLEWHITE (Joseph D) Tuberculosis in the Negroes of Georgia. Economic, Racial and Constitutional Aspects.—*Amer Jl Hyg* 1939 Mar Vol. 29 No 2 Sect. A. pp 61-110 With 4 figs [37 refs] (Summary appears also in *Bulletin of Hygiene*)

This is a detailed and careful study of 705 coloured non tuberculous persons and 138 coloured tuberculous subjects in Georgia, U.S.A. to assess the influence of habitus race and other factors on the incidence of tuberculosis. It should be read by all interested in the tuberculosis of native races.

The results of an anthropological study which was very fully carried out are treated statistically and the conclusion is arrived at that the Georgia series is a representative racially mixed Negro sample and that the conclusions drawn from a study of it are based on unbiased, unselected, adequately determined data. There is no doubt that tuberculosis takes a disproportionate toll among the negroes and it has been held that susceptibility is a racial characteristic and by CARTER that the darker negroes show less resistance than the lighter. The present investigation however failed to reveal any difference in incidence or (probably) in resistance in the miscegenetic types studied.

Since the time of Hippocrates it has been seen that tuberculosis is frequently associated with a certain physical habitus. In the present study in which negroes are compared not with whites but with negro-whites extensive measurement data (which do not and should not include the changeable feature of body weight) show that the various negro types are indistinguishable in bodily proportions and that the differences between the tuberculous and the non tuberculous can be explained as effects of the disease and not therefore, as predisposing factors.

A survey of the socio-economic conditions of the negroes studied brings out the fact that one group consisting of negroes with a greater degree of white admixture has an environmental advantage over other coloured people of the community. The reason for this may well be their interest in emulating the white side of their ancestry. At the same time the incidence of tuberculosis in this group is less frequent than in the others. In general it was found that gross overcrowding occurred among the mass of the negroes investigated and that this was related to the economic status. Further it was shown that tuberculosis was largely a matter of house contact and that overcrowding and contact possibilities were least in the more advantageously situated group referred to above. In this respect therefore but not directly racial mixture plays a part in the epidemiology of the disease.

In discussing prevention and control the authors emphasize the importance of preventing the mass infection which too commonly takes place in such communities and refer to the finding of OPTIE that diseased negroes like other communities whose experience of tuberculosis is of comparatively recent date tend to scatter tubercle bacilli in vastly greater number for much shorter periods of time than those affected with the usual chronic type of pulmonary tuberculosis. The incidence of mass infection can be greatly diminished by provision against overcrowding. Free institutional care is often given only to those who show some possibility of improvement while those with advanced disease are left to spread their infection at home. This

policy attempts to prevent mortality of the individual while permitting morbidity and mortality of the group.

The programme suggested for a campaign to control tuberculosis in the American negroes does not accept the view that in resistance they differ greatly from the whites and recent experience of collapse therapy supports this conclusion see also *Bull of Hyg.* Vol. 14 p. 128]. It is based on the principle of prevention of mass infection and may be summed up as to "identify the infected, isolate them and better the living conditions of this population generally" [Presumably by the infected are meant those actually diseased. Readers will see the similarity between these basic principles and those advocated in England by Lissant Cox — "Find, isolate, educate and treat the adult positive case."] C W

REVIEWS AND NOTICES.

FIELD (J W) *Notes on the Chemotherapy of Malaria.*—*Bull Inst. Med Res. Federated Malay States.* 1938 No. 2 pp vii+180 With 39 figs.

This short, up-to-date publication by an author with large experience, will be welcomed by malarialogists. It is based on a series of lectures delivered in Singapore, at the 4th International Congress on Malariology. The literature on the subject has been widely consulted and quoted with the author's own views. The reader feels that many lacunae in his previous knowledge have been filled up.

There is a brief historical introduction dealing with quinine, the advent of new synthetic drugs and the development of new methods in the treatment of malaria, associated with the use of induced malaria in the treatment of G.P.I. patients. It has now become necessary as the author points out to desire an antemalarial drug in parasite

has also its limitations in drug testing as the author states and actually the above-mentioned amudine was ineffective against *P. relictum* infections of canaries, although moderately active in B T and monkey malaria.

The history and use of atebryn is also discussed fully. Evidence is adduced that a combination of atebryn and plasmoquine is not desirable but favourable reports on atebryn tablets have been received from India and elsewhere. Other drugs which have failed to stand the test of experience are briefly described.

Specially valuable are the suggestions outlined for the treatment of malaria in various circumstances. Quinine plasmoquine and atebryn have all been used successfully in pregnancy complicated by this disease. In some communities B W F has disappeared as the result it is claimed, of taking small daily prophylactic doses of quinine.

The question of chemoprophylaxis is dealt with from a theoretical and practical standpoint and indications for its employment outlined. It is still doubtful whether any antimalarial, given in non toxic doses can prevent infection following the bite of an infected mosquito. Post prophylactic recrudescence of attacks is a problem of considerable gravity. The author has serious doubts about the value of attempting to eradicate malaria by drug treatment alone.

The bulk of evidence regarding the influence of chemoprophylaxis on natural immunity suggests that the latter process is slowed down during treatment but that pre-existing immunity is probably not lost. It is concluded that the interests of scattered populations are probably best served by mutual adjustment between parasite and host so long as life is safeguarded by a judicious use of quinine.

Apart from some minor mistakes in print such as representing neo-salvarsan with two sodium atoms the compound C77 with a double-bond in the bridge structure of the piperidine ring and the Cl atom by two capital letters the book is well produced. Schülemann's name is consistently spelt with a single 'n'.

The appendix contains the 4th General Report of the Malaria Commission of the Health Organisation of the League of Nations and is most valuable. The reviewer is glad to have had the opportunity of reading this book.

J D Fulton.

BISQUERRA (E D) *Le traitement du kals-azar* [Treatment of Kala Azar]—273 pp With 13 graphs. [Bibliography] Algiers Imp Navarro.

This book is a thesis presented to the Faculty of Medicine in Algiers and as such is a review of the literature on the subject of its title rather than an account of personal experiences in the treatment of the disease. In fact there is little evidence that the author has had any personal contact with cases or has treated any on his own account. Nevertheless, the literature of the subject running to over three-hundred and fifty references, has been carefully reviewed and various conclusions have been drawn. The chief of these appear to be that once diagnosed, the disease must be treated by a short and intensive course of some antimony derivative and that after the course the case must be watched for a month before deciding that further treatment is not necessary. The clinical course alone will decide this point. For a further period of five months the patient must be under observation,

so that the first indications of any relapse can be detected. If after this there is continued good health it is safe to conclude that a cure has resulted.

C. M. Wenyon

SIMMONS (James Stevens) [B.S. M.D. Ph.D. S.D. etc.] with the Collaboration of George R. CALLENDER M.D. Dalferes P. CURRY M.D. Seymour C. SCHWARTZ B.S. M.D. Dr. P. H. & Raymond RANDALL, D.V.M. *Malaria in Panama.—Amer. J. Hyg. Monographic Series* 1939 Jan. No. 13 pp. xv+328 With 32 figs (2 folding) [Bibliography] 1939 Baltimore Johns Hopkins Press. [\$1.00]

For a book in which the subject matter is contained in just over 300 pages this volume is extraordinarily comprehensive yet throughout the work one is impressed with the conviction that the authors one and all are thorough masters of the material with which they are dealing.

The climatology and physical geography of the Panama Canal region in their special relationship to the presence of malaria are adequately discussed and sufficient historical data are given to afford a useful background to the general account of the attempts to construct a canal previous to the final successful effort of the United States Government.

The account given of present conditions in the Panama Canal area is a useful corrective to the widely prevalent idea of the unconstructed that malaria has been completely wiped out from Panama. In this connection a clear description is given of the distinction to be drawn between the areas sanitated by the public health services, civil and military, of the United States authorities and the unsanitated areas lying beyond the Canal Zone which are a constant menace to the former on account of the severity and extent of malaria prevalence in these uncontrolled surrounding areas.

It is shown that the control of the disease is more effective among the employees of the Canal Zone than among the United States troops stationed in the area—a condition probably caused by the greater exposure of the latter to infection in the performance of their duties in areas or among populations imperfectly protected.

It is pointed out that in spite of the enormous improvements effected by anti-malaria operations malaria is still the commonest single disease among Canal employees. Thus between the years 1914-1938 the malaria admission rate has averaged between 11 and 19 per 1,000 admissions and this figure is being maintained.

A mass of details impossible to enumerate here is given in tables which should be of great help to students of malariology and the same remark applies to the enumeration of the various species of *Anopheles* their distribution and habitats.

An account of the various methods of malaria control employed in the Canal Zone need not be specifically mentioned here as they are on orthodox lines and now well known, but certain points emerge from the description which are worthy of note. These are —

(a) The Health Department of the Panama Canal has been able to sanitize effectively only relatively small areas near the principal towns while no practical and economical method has been devised for dealing with the country in general. The same remarks apply to military posts.

(b) The introduction of agriculture and hence settlers into the Canal Zone and the development of road transport have led to an increase of malaria owing to the less strict control exercised over the settlers who are largely negroes.

(c) The failure of drug treatment by itself to control malaria.

(d) Permanent stability in control of malaria has not and probably never will be achieved in the Canal Zone. Any relaxation of vigilance or failure to apply proved methods of prevention will be rapidly followed by a deterioration in sanitary conditions generally and especially as regards malaria prevalence.

The book is too full of detail to be read as a narrative but the authors are to be congratulated on producing a work which will obviously become a source of reference for students of public health in the tropics and especially for those interested in the history of what is probably the greatest engineering feat performed in the tropics under conditions where sanitary science was a deciding factor in success. That the style in which the book is written is particularly facile and explicit to a degree which many books of science fall far short of adds appreciably to its value.

H E Shortt

SOCIEDAD ARGENTINA PATOLOGÍA REGIONAL. Novena Reunión celebrada en Mendoza 1, 2, 3 y 4 de octubre de 1935. En homenaje a la memoria de Carlos Chagas. Tomo Tercero [Report of Ninth Congress of Northern Argentine Pathological Society, Vol 3]—pp 1417–1993. With numerous illustrations. 1939. Buenos Aires. Imprenta de la Universidad.

The first volume of papers read at the Ninth Congress of the Society in October 1935 was issued in 1936 and was reviewed in this *Bulletin* [1936 Vol. 33 p 971] the second appeared in the following year but was not sent to the Bureau. The third has only recently been published. This delay of nearly four years is greatly to be deplored as the subjects dealt with were of no little interest at the time but have lost much of their importance now and no longer call for detailed abstract. This volume contains altogether 50 articles 35 of them by Professor MAZZA and his colleagues. The following are still worth bringing to the notice of readers. ARAGÃO has contributed some notes on the Ixodidae of the Argentine and ORFILA writes of the Simuliidae and their distribution both of these are useful for reference. REGENDANZ & MUÑOZ have investigated the transmission of typhus in San Pablo by *Rhipicephalus sanguineus* and show that the larval nymph and adult stages are infective but that infection is not transmitted to the next generation the ova not being infected. There are two papers on Chromoblastomycosis the condition being due in each case to *Hormodendron chaquense* which is described and depicted. Fifteen papers are contributed on some aspect or other of Brucellosis, epidemiological, epizootological, clinical or serological. Its presence is almost natural in a cattle country and the findings detailed in the various articles are now well known. Several cases of American cutaneous leishmaniasis are presented with illustration of the lesions. MAZZA and CORNEJO discuss the question whether cutaneous leishmaniasis invades the bone beneath and describe a case in which lesion over the metacarpals was associated with localized thickening of the

periosteum of these bones and the first phalanges. The latter change was not extensive and was probably irritative merely from the overlying inflammatory condition. H H S

TROWELL (H C) [M.D. M.R.C.P. (Lond.) etc.] *Diagnosis and Treatment of Diseases in the Tropics*. Baillière's Medical Manuals for Africans—pp xvi+205 With 35 figs. 1939 London: Baillière Tindall & Cox, 7 & 8 Henrietta Street Covent Garden, W.C.2 2s 6d]

It is recognized by thoughtful teachers of medicine that the principal difficulty in the preparation of text-books for African Natives lies in the nice discrimination between over-simplicity and over-complexity in both the matter and the manner of its presentation. The author is well aware of this difficulty and, drawing from his considerable experience in the teaching of nursing orderlies and of students of the Mulago Medical School, has set out in clear but not childish language (which is too often used in such work) what he considers to be the bare minimum necessary for any comprehension of medical and surgical diseases. It is made clear that the book is not intended to be read without tuition, and the aim of the instruction given is that the orderly should be able to nurse intelligently. It is indeed an encouraging sign that with increasing specialization of teaching there should be an increasing demand from the native of more than mere routine obedience to orders.

The book opens with a chapter on the general principles of medical diseases, followed by one on common signs. Then follow chapters on the general principles of surgical diseases, common surgical diseases, special varieties of inflammation, and special surgical diseases. Part 3 deals with general fevers, fever due to local inflammation, diseases of the digestive tract and special medical diseases. Part 4 is devoted to special diseases, including venereal disease, yaws and others not included in earlier chapters. At the end of each chapter is a summary and a group of questions such as might be set in an examination. Illustrations are plentiful and much use of heavy type has been made.

The arrangement of the various diseases in the chapters is not in accordance with usual practice, but this is a small matter. The point is that if an orderly knows this book well, and grasps the reasoning which is presented he will be able to nurse intelligently. In the opinion of the reviewer the book is not beyond the capacity of the ordinary African orderly. C H

TROPICAL DISEASES BULLETIN.

Vol. 36.]

1939

[No 11]

SUMMARY OF RECENT ABSTRACTS

IX. LEPROSY *

Classification —RABELLO (p 290) suggests a method for the details of which the original abstract should be consulted and WADE (p 290) has also contributed to this subject RYRIE (p 550) uses a method in which letters are employed to signify the resistance of the patient and KUSVETZOW (p 550) advises that four phases of the disease should be recognized

Epidemiology —There are a few lepers still in Great Britain but MACLEOD (p 545) shows that the majority are adults who have returned from tropical countries. In Italy the same process is occurring in peasants who return after emigrating to Latin America. BROCCIERI (p 285) quotes the case of a woman who had never been away from Italy and gave no history of contact but who acquired leprosy probably he considers through contact with a returned leprous emigrant

In Estonia PARMAKSON (p 883) shows that cutaneous disease is more common than neural Women are more frequently attacked than men and the highest incidence is in the age groups 30-39 The average duration to death was 15 years and 19.3 per cent. of patients recovered under treatment of whom 11.4 per cent later relapsed.

DALGAMOUNI (p 558) estimates that there are 15 000 lepers in Egypt. He describes the work done in the clinics.

In S.E Nigeria OBERDÖRFFER (p 882) found from 3 to 5 per cent of the population to be infected but there were comparatively few women and children affected (but see below DAVEY) The disease was most active in the dry months and he associates high rates with the consumption of coco-yams which contain toxic substances. DAVEY (p 882) reports that it is the native custom to segregate lepers in small villages close to the main villages but in one main village there still remained 65 lepers. In the areas examined, female cases outnumbered male by almost 2 to 1 Slightly higher female than

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin* 1938 Vol 35. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

male rates were found in the lower Congo by the FORLAMI staff (p. 284) and the total rate varied from 1.7 to 4.3 per 1,000. In Basutoland, GERMOYD (p. 286) reports a rate of 3.2 per 1,000 of which 90.5 per cent were mild neural cases. STRACHAN (p. 285) shows, in the same country that the average age on admission to hospital was 36.5 years and all except a quarter had had the disease for less than 2 years on admission.

CILENTO (p. 287) reports that leprosy is a serious problem in New Guinea and that increasing numbers are being found in the Solomon Islands. AUSTIN (p. 545) from Makogai shows that it is more severe in Fijians than in Indians.

Contact—The subject of contact is touched upon by several authors. MOISER (p. 881) considers that leprosy is spread in S. Rhodesia during native beer drinks and advises that lepers should, therefore, be prohibited from taking part. In French Equatorial Africa LE BIHAN (p. 545) found a very high proportion (1,182 of 1,832 cases) of direct family antecedents. He considers that goitre which is very prevalent, does not predispose to the disease but that elephantiasis does. In Bengal LOWE (p. 883) found contact history in 80 per cent. of cases. The incidence was 4.38 per cent. and infections were found mainly in early life and mainly in males, in whom the disease was severe. The majority of patients showed neural infections. Infection was traced to open cases in half of the patients reported by COCHRANE and RAJAGOPALAN (p. 885) who found a rate of 6 per cent. in a school survey in Madras.

INNES (p. 832) considers the distribution in the British Solomon Islands to be that of a small group or family disease, and found an incidence rate of 1.02 per cent. [see CILENTO above]. At the Nauru Island segregation camp CLOUSTON (p. 291) shows that 5 of 24 children born to lepers but separated at once from their parents, developed the disease after the age of three. It was not however possible to be certain that no contact had taken place with other lepers on the island.

On the other hand, in the Dutch East Indies LAMPE (p. 884) found that infections other than familial account for 66 to 80 per cent. of cases and only rarely were as many as three cases found in one family.

McCoy (p. 557) stresses the importance of family transmission, but admits that the exact mode is uncertain. He does not (p. 545) think that climatic conditions can explain the varying trends of leprosy in the United States, nor does he see convincing evidence that any control measure yet attempted has been successful in retarding spread, though he approves of attempts by the colony method. ARCOCK and MCKINLEY (p. 884) think that inherited susceptibility is a factor in contact spread.

In an examination of 15,424 contacts in Mexico URUERA (p. 546) reports that 83 patients, who would ordinarily have escaped observation, were found. Housing conditions were bad and 6,739 persons, including 2,717 children were living in the same rooms as lepers. Serious nodular cases accounted for 30.1 per cent. of the 3,882 lepers studied. In the Argentine BALISA and BASOMBRIO (p. 881) show that the incidence on the coast is higher than in the dry Andes area, which supports the theory of ROGERS of the influence of humidity. High density of population also favours high incidence but conjugal infection was rare in the series examined and only occurred in bacillary positive cutaneous cases. In three-quarters of 892 cases the first symptoms were cutaneous. DO PATIO and PEREIRA (p. 286) advise

weekly examinations of contacts so that treatment can be commenced at an early stage. The majority of contacts who develop disease do so within 3 years but the interval may be 5 years or more. PORTUGAL (p 284) records the following contact figures family 11 per cent, conjugal 9.2 per cent other 16.7 per cent. The heaviest incidence in the 873 cases studied occurred between the ages of 20 and 40 and in general males were rather more frequently attacked than females. Cutaneous and mixed forms accounted for from half to two-thirds in different areas.

Bacteriology—ADLER (p 293) succeeded in infecting the Syrian hamster *Cricetus auratus* with material from human leprosy nodules having previously removed the spleens of the animals. Evidence of multiplication of bacilli was obtained in 3 of the 4 animals used and of generalization in one of the three. With ASHBEL (p 888) he showed that leprosy bacilli in thin sections of tissue dried over sulphuric acid were still able to infect hamsters after 7 days. WATANABE (p 888) has succeeded in subtransplanting for three generations granulating tissues resulting from inoculation of human leprosy material into rats previously treated with venom.

Cultivation—MCKINLEY and DE LEON (p 292) have subcultured the bacilli isolated in 1931 through 60 generations during which no luxuriant growths have developed. This is in contrast with the experience with other acid fast bacilli thought to be *Mycobacterium leprae*. They describe a gas tension incubator for mass culture in controlled atmospheres used in conjunction with hormone glycerol agar medium. SALLE and MOSER (p 292) used this gas environment which is based on an oxygen-carbon dioxide mixture, and succeeded in cultivating *Mycobacterium leprae* on glycerine veal agar slopes. They were also successful in cultivation on glycerine veal agar with the addition of embryonic chick tissue. Positive results with acid fast and non-acid fast rods were obtained in 190 of 311 tubes and flasks when the inoculum consisted of nodules removed aseptically and minced.

FAURE BEAULIEU and BRUN (p 887) claim to have cultivated the organism and to have found mutation between the acid fast and non-acid fast granules which they have observed in leprosy lesions. PAPAIOANNOU (p 892) reports successful cultivation and transmission of human and rat leprosy bacilli to various rodents.

MANALANG (p 887) also reports acid fast and non acid fast forms of *Mycobacterium leprae* in both treated and untreated lesions the latter being regarded as young or degenerating forms. In glands kept *in vitro* with preparations of *H. wrightiana* especially when these are applied intermittently the acid fast forms largely change to the non-acid fast. This may explain the greater efficiency of intradermal injections of these preparations when they are applied intermittently.

ANDERSON *et al* (p 294) report on the chemical constitution of acetone-soluble fat of *Mycobacterium leprae*.

Since ordinary methods of disinfection fail to remove leprosy bacilli living or dead from instruments BEAUDIMENT and TIVOLLIER (p 888) recommend 1 to 2 per cent of soda for this purpose.

RADNA (p 551) reports positive bacteriological results in the examination of the sediment of dehaemoglobinized venous blood in 84.31 per cent of cutaneous and mixed cases. LLERAS ACOSTA (p 551) has isolated an acid fast bacillus in culture experiments on the blood of patients with nodular disease. He used Petragram's medium and succeeded in 20 of 66 patients. With this bacillus as antigen

he found positive complement fixation tests to be given by 99.38 per cent. of bacteriologically confirmed lepers, 92.5 per cent. of clinically diagnosed lepers, 11.38 per cent. of children of lepers, 18.48 per cent. of healthy contacts and 38.12 per cent. of cured patients. Only 0.09 per cent. of normal persons were positive. Intradermal tests performed with a leprolin prepared from the bacillus were positive in normal controls and negative in lepers which he explains as an indication of immunity. [See also SATO below.] SAENZ (p. 887) repeated these serological tests, but used as antigen an acid fast bacillus obtained from tap water. His results were identical with those obtained by LLERAS ACOSTA. He found also that the two bacilli produced on intradermal injection the same reactions as were given by other acid fast saprophytes. SATO (p. 559) recovered 14 strains of saprophytic acid-fast bacilli from 30 rats infected with rat leprosy. Serological tests with a variety of antigens, including preparations of leprosy and tubercle tissues, produced positive results in from 0 to 25 per cent. of infected rats and in from 5 to 100 per cent. of human leprosy infections. Normal rats and healthy persons were all negative. By precipitin tests, HENDERSON (p. 292) found group affinity in 13 of 15 strains of acid fast bacilli isolated from lepers, and shows that these strains have a group relationship with *Mycobacterium*. [The findings of the three latter workers do not invalidate the claim that the bacillus of Lleras Acosta is useful in the serological diagnosis of leprosy but they constitute a strong argument against its specificity. The finding of acid-fast bacilli in blood, which in such work is usually treated with various reagents has in recent years been a highly controversial subject.]

RAHELLO and PLATO (p. 889) found the Witebaky-Klingenstein and Kuhn complement fixation test (with a tuberculin antigen) to be positive in 68 per cent. of tropho-neurotic cases, 60 per cent. of macular cases and negative in 70 per cent. of cutaneous. This is the opposite of the results of the Mitsuda test.

Positive Wassermann and Kahn tests in mild and early cases are considered by MUIR and ROY (p. 532) to indicate coincident spirochaetal disease but not necessarily so in advanced cases, especially if subject to leprosy fever. GUNDERSEX and BERNER (p. 552) regard them as indicating syphilis.

Skin tests.—In the *Monthly Bulletin of the Bureau of Health* Manila (p. 295) is a statement of the results of 5,174 skin tests performed with products derived from different types of acid-fast organisms including those isolated from cases of leprosy and the strains cultivated by McKINLEY and SOULE [see McKINLEY and DE LEON above]. In no instance did the positive reactions in leprosy exceed the negative and no definite conclusions can therefore be drawn.

The leprolin test was used by CAMPOS (p. 553) on 331 healthy children of lepers. He found that positive results increased with age from 22.6 per cent. under 3 years to 88 per cent. over 13. Children removed from parents at birth were negative. The test is negative in the uninfected and the heavily diseased, and positive in healthy contacts and in those with slight lesions. RADNA (p. 889) similarly reports negative reactions to the Mitsuda test in active cutaneous, and positive in nerve and recovering cases. A positive result in a previously negative case is a good sign. RODRIGUEZ (p. 553) regards negative results in cutaneous cases as due to anergy and positive

reactions in such cases as constituting a favourable sign. PARMARSON's results (p 554) support this latter conclusion.

Clinical—Sternal puncture was used in diagnosis by LOWE and DHARMENDRA (p 291) who found acid fast bacilli in 16 of 32 patients with nodular disease but in only 1 of 18 nerve cases. Gland puncture yields the bacilli in nodular disease but VAN BREUSEGHEM (p 291) finds it of no value in nerve leprosy. He uses a sweating test by covering the area of skin with Tr iodine allowing to dry covering with starch and then attempting to provoke sweating by light exercise. If sweating occurs the starch is turned blue.

DUBOIS *et al* (p. 290) point out that histological diagnosis in early leprosy is not always certain and confusion with tertiary syphilis may occur.

Tuberculoid leprosy—RABELLO (p 548) argues that tuberculoid leprosy presents clinical and pathological changes similar to those seen in the Besnier Boeck sarcoid and Schaumann's syndrome, but REENSTIERNA, admitting the similarity of the skin lesions and of the radiological appearances in bones and lungs states that the leprosy bacillus has not been shown to be capable of producing the systemic reactions of Schaumann's syndrome. FERNANDEZ (p 289) regards the tuberculoid leprosy reaction as an allergic phenomenon with intense tissue reaction in the early stages and later necrosis due to invasion of the sensitized tissues by the bacilli, which increase in number as the reaction diminishes. DA ROSA (p 550) holds that the lepra reaction is allergic but that it is not specific since the bacilli are not found in the skin.

HUGHES (p 547) regards the tuberculoid form as a stage in the natural evolution of immunity so that it is common in races which have for long been associated with leprosy.

TISSETIL (p 289) describes 4 cases in which tuberculoid lesions thought to be primary leprosyous chancres were present in children. In 42 neural cases in Madras 7 were classed as major tuberculoid, 6 as minor tuberculoid or intermediate 5 as retrogressive papulate and 24 as simple by WADE *et al* (p. 547). WADE and FRASER (p 289) report that tuberculoid lesions are fairly common in S China being found clinically in 23 of 225 patients examined. In all except 1 of 31 neural cases from which biopsy material of the leprides was taken tuberculoid changes were seen.

WADE *et al* (p 885) describe the microscopical changes in nerve lesions. Activation may be related to climatic conditions. Changes in the finger prints of 12 per cent. of neural cases 9 per cent. of macular and mixed and 6 per cent. of nodular cases are reported by VIEIRA and DE ABREU (p 547). The changes are first evident in the little and ring fingers which points to ulnar distribution.

MITSUDA and NAGAI (p 288) attribute the alopecia frequently seen in leprosy over the course of the larger veins to infiltration of the perivascular lymph spaces and consequent pressure around the hair papillae causing malnutrition and atrophy.

OBERDÖRFFER (p 284) found nasal lesions in 62 per cent. of patients in the Idu leper colony in S Nigeria. These were mostly localized, especially on the anterior nasal septum.

The basal metabolism in leprosy according to JUNIOR (p 283) is increased, but in quiescent cases tends to fall to normal. The leprotic reaction increases the rate.

RYNIE (p. 886) from an experience of 600 cases shows that leprosy does not influence pregnancy but pregnancy causes slow progressive spread of the disease in the later months, probably through mineral depletion, since the exhibition of calcium tends to check this aggravation. The placenta and cord are not affected and children removed at birth remain healthy.

NAKAJYO and SUZUKI (p. 294) obtained cultures of tubercle bacilli from the sputum of 30 lepers in 100 examined.

Control and treatment.—In the Sudan it is held that although leprosy is well under control, improved diet and standards of living will be necessary for its permanent eradication (p. 286). CILENTO (p. 287) advises re-examination of contacts for every 6 months for 5 years in Australian territories. For the aboriginals only segregation is likely to be effective since they fear medical treatment. The development of agricultural and industrial work by inmates of leper colonies is shown by reports from N Nigeria (p. 284) Basutoland (p. 285) and Egypt (p. 286). But in connexion with segregation MUIR (p. 546) considers that compulsion should only be applied by the community itself—never from without. Treatment by general methods, combined with chaulmoogra, is important.

Chaulmoogra.—A comprehensive account of this and allied oils has been written by SCHLOSSBERGER (p. 296) and LOWE and DE (p. 556) give tests for the suitability of hydnocarpus oil for injection. Decomposition of the esters of *H. zeyheriana* oil is responsible for irritation occasioned on injection. This can be removed, according to COLE and CARDOSO (p. 296) by neutralization and blowing out with steam. LABERNADIE and GUICHARD (p. 800) report that the neutralization of hydnocarpus oil by the procedure of Le Naour and Roubaud yields a product free from glycerine but in which the content of active glycerides is slightly increased [not as stated in the original abstract "containing little active glyceride"]. BARÉ (p. 891) reports success with intravenous neutralized chaulmoogra oil.

WOODMAN (p. 285) speaks favourably of chaulmoogra treatment in early leprosy in the Sudan, and of the value of settlements in segregation and MOISER (p. 681) reports that 80 per cent. of patients obtained benefit from moogrol treatment in a hospital in S Rhodesia. At the Urnakoh Leper Colony in N Nigeria a mixture of hydnocarpus oil 25 per cent. its esters 25 to 62½ per cent. with 12½ per cent. of cod liver oil, 12½ per cent. olive oil and 4 per cent. creosote in doses of 1 to 10 cc. is used for treatment by injection (p. 284).

Intradermal treatment is reported by STRACHAN (p. 286) to be popular in Basutoland. LIMA (p. 554) speaks highly of the intradermal infiltration of chaulmoogra and its derivatives: the majority of patients are improved but chaulmoogra does not seem to have any effect on ocular lesions. VALLE (p. 549) in fact states that these preparations are liable to provoke dangerous reactions in lesions of the eye and therefore advises that they should not be used in such complications. The anterior segment of the eye may be invaded from the lids and cauterization, peritomy and iridectomy may be necessary to prevent invasion. He endorses the value of trypan blue treatment.

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In ulceration of the foot LOWE and CHATTERJI (p 297) advocate the injection of hydnocarpus preparations along the course of the tibial nerve since infiltration of that nerve is present in such cases. Surgical decapsulation of the nerve relieves pain but does not induce healing. BOUSEFIELD (p 549) after removal of necrosed bone uses mild antiseptic solutions of 0.5 to 2 per cent. copper sulphate together with intramuscular and local intradermal injections of iodized chaulmoogra esters. This treatment combined with plentiful good food is very successful.

PAGET (p 297) investigated the components of the oil of *Carpotroche brasiliensis* which is used for treatment of leprosy in Brazil, and which contains the characteristic chaulmoogric and hydnocarpic acids. TISSEUIL *et al* (p 890) report that ground nut oil has only a feeble action in leprosy but that Gorli butter produces slow improvement in tuberculoid cases. TISSEUIL (p 298) reports favourable results with synthol soufflé in the treatment of perforating ulcers.

Methylene blue—LE BIHAN (p 545) advocates this drug for pains when combined with chaulmoogra treatment. Remarkable and promising results are reported by DE ALMEIDA and DE MOURA COSTA (p 889) from the administration of 2 or 3 intravenous injections of 5 to 10 cc. methylene blue (strength not stated) followed when the drug is no longer being excreted in the urine by placing the patient in a pressure of 2.5 to 3.5 atmospheres of oxygen for varying periods. Clinical improvement occurs with great alteration and diminution of the bacilli in the lesions. The treatment is based on the fact that anaerobic organisms cease to develop under an oxygen pressure of 4 to 5 mm. mercury. ROGERS suggests a trial of this method with chaulmoogra in place of the methylene blue.

To overcome the reactions which occur to intravenous methylene blue TISSEUIL (p 891) uses intravenous injections of 0.1 per cent. of that drug in 4 per cent. glucose and 0.4 to 0.9 per cent. saline. If fever persists the injections should be stopped for a time.

Other drugs—TISSEUIL (p 300) reports 4 patients with laryngeal leprosy relieved rapidly by yohimbine by the month. FLORIANI and FLORIANI (p 298) used a 2.5 per cent. aqueous solution of the total alkaloids of the bark of *Aspidosperma polyneuron* in the Argentine for intramuscular injection in leprotic ulceration. Good results were obtained in 15 cases. Others were given preparations of *Bixa orellana* and both drugs are advocated.

Tellurium and its sodium salt retard the development of rat leprosy diminishing the vitality of but not killing the bacilli. MARCHOUX and CHORINE (p 297) used the method in man but the results though beneficial, were not lasting. Carbon dioxide snow proved useful in a case of leprosy with extensive rose coloured annular plaques treated by VIGNE *et al* (p 299).

Vaccines and Sera—PEREIRA (p 299) reports apparent benefit from the use of Vaudremer's vaccine in those with fever and debility and in early nerve lesions. In ocular cases it may be dangerous and it has no effect on nodules, ulcers or sensory disturbances. Temporary improvement due to antirabic vaccine is attributed by TISSEUIL and GUILHAUMOU (p 299) to simple biotherapy. REENSTIERNA (p 299)

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LAFFÈRE (p 889) reports a patient who had a relapse of malignant tertian malaria after blackwater fever

KRISHNAN (p 889) has treated 7 patients with glucose ascorbic acid and cortin and records beneficial results with complete recovery in all but YORKE comments that further evidence is necessary before proof of benefit is established.

C IV

FAIRLEY (N Hamilton) *Methaemalbumin (Pseudo-Methaemoglobin)* [Correspondence.]—*Nature* 1938 Dec. 31 Vol. 142. No 3609 pp 1156-1157

— & BROMFIELD (R. J.) I. Pseudo-Methaemoglobin—Its Synthesis from Crystallalbumin and Alkaline Haematin. II. Pseudo-Methaemoglobin—Its Demonstration in the Marchiafava-Micheli Syndrome of Nocturnal Haemoglobinuria [Demonstration]—*Trans Roy Soc Trop Med & Hyg* 1939 Jan 28 Vol. 32. No. 4 pp 431-433

In a previous paper Fairley suggested the name pseudo-methaemoglobin for a new blood pigment formerly confused with methaemoglobin found in the plasma of blackwater fever cases. [This *Bulletin* 1937 Vol. 34 p. 841] This pigment is derived from extracorporeal oxyhaemoglobin. Fairley has since demonstrated the same pigment in nocturnal haemoglobinuria incompatible transfusion and pancreatic cyst fluid.

It has long been recognized that, on incubation solutions of haemoglobin yield methaemoglobin and later haematin. Fairley showed that when oxyhaemoglobin was incubated at 40°C for 24 to 72 hours in the presence of human plasma, pseudo-methaemoglobin was produced. Similarly when alkaline haematin was added to human plasma or serum, pseudo-methaemoglobin immediately appeared. This suggested that haematin was coupling with some protein to form a new compound. Apparently only human and simian plasma contained the constituent coupling with haematin to form pseudo-methaemoglobin.

Further work showed that alkaline haematin produced pseudo-methaemoglobin only with the albumin fractions and never with the pseudo-globulin or euglobulin fractions of serum protein. Of the albumin fractions only crystallalbumin proved capable of forming pseudo-methaemoglobin. Finally it was noted that whilst the intravenous injection of alkaline haematin into *Macacus rhesus* produced pseudo-methaemoglobin similar injections failed to produce it in rabbits.

Certain details are given concerning the spectrum of the synthesized pigment and its chemical and physical behaviour. From this work it is concluded that pseudo-methaemoglobin is modelled on the methaemoglobin pattern but that while the prosthetic group is similar the protein component is native serum albumin instead of native globin. The iron is held in the trivalent state and is even more resistant to reducing agents than methaemoglobin itself. In view of these findings Fairley proposes to change the name of pseudo-methaemoglobin to methaemalbumin.

It is noted that as methaemalbumin is never found within the corpuscles it cannot function as a respiratory pigment. It is derived from circulating extracorporeal haemoglobin liberated during intra vascular haemolysis or from blood which has escaped into

is present in certain localities only. The present note describes two cases of blackwater fever occurring in Egyptians who have not left the country.

This is followed by a discussion on the pathogenesis of blackwater fever in which the following remarkable sentence occurs. Apparently in Egypt urticaria in malaria takes the place of the much rarer condition blackwater fever. H Y

MARSHALL (F) Das Schwarzwasserfieber in Santo Domingo [Blackwater Fever in Santo Domingo]—*Arch f Schiffs u Trop Hyg* 1939 June. Vol. 43 No 6 pp 266-273 With 1 fig

In the islands of the Great Antilles which have a similar origin the distribution of tropical diseases is very different. In Porto Rico for example *Schistosoma mansoni* infections are widespread whilst in Santo Domingo the parasite is not found. Blackwater fever is common in Haiti and is not uncommon in Jamaica and Santo Domingo but it is extremely rare in Porto Rico. This is so much the more striking since the inhabitants of these islands belong to the same race and the climate soil fauna and flora are all similar.

Actually blackwater fever in Santo Domingo is not common about 40-50 cases yearly being recorded. The disease is chiefly found in the western portion of the Republic bordering on Haiti and particularly in the districts of Azua San Juan and Barahona. In these provinces malaria is also commonly met with.

Clinical details and the post-mortem findings of a case of blackwater are recorded at length. The author then passes to a discussion of four theories which have been advanced to explain the disease 1. that it is due to a specific organism such as a spirochaete 2. that it is due to a special malaria parasite which exhibits a particularly powerful haemolytic action 3. that it is the consequence of a sensitization to particular drugs (quinine) resulting from malaria and that it belongs to the allergic or anaphylactic reactions. After discussing these various hypotheses at some length the author concludes that the last is probably correct. H Y

FOY (Henry) & KONDI (Athena) Spleen Puncture Findings in Blackwater Fever—*Trans Roy Soc Trop Med & Hyg* 1938. Nov 26 Vol. 32. No 3 pp 347-354

During the past two years the authors have punctured the spleens of all patients with blackwater fever who have come under their control and they have correlated their findings with fairly extensive biochemical and biophysical examination of peripheral blood. They have recorded their data in tabular form and give the following summary of their observations and conclusions —

1. That there is little or no evidence of heavy malaria infection just prior to the onset of the blackwater fever in the great majority of cases.
2. That if the presence of pigment in the spleen may be taken as evidence of recent schizogony then very few cases of blackwater fever can be said to be suffering from active malaria at the time of the onset of their haemoglobinuria.
3. That the absence of pigment in the spleen may either mean that active schizogony was not going on, or that the organism possesses very variable ability to dispose of pigment rapidly.

4 That in some patients vast amounts of pigment can be found for very long periods after the initial attack of blackwater whilst in others none or only the barest traces can be found after the lapse of only a few hours from the first passage of black urine

5 That the rate at which the spleen disposes of pigment is an extremely variable factor not dependent upon the time or amount of quinine taken prior to the onset of the blackwater

6 That the reticulo-endothelial system would appear to play an important role in this pigment destruction rate

7 That the correlation coefficient between the last dose of quinine and the first passage of black urine is so significant (0.87) as to make it appear that there is more than a casual relationship between the two although quinine is by no means an essential pre-requisite since blackwater does occur after atehrin, etc.

8 That there is little difference between peripheral blood examination and spleen puncture so far as parasites are concerned the latter is a little superior so far as pigment is concerned.

9 That patients who have been in hospital and have taken a full treatment for malaria with either atehrin or quinine, sometimes go down without any warning with blackwater fever their bloods and spleens being negative for both parasites and pigment. H J

SARCINELLA (Franco) La febbre bishosa emoglobinurica ed i suoi rapporti col chunmo e la malaria. [Blackwater Fever and its Relationship with Quinine and Malaria].—*Rass. Sanitaria dell'A.O.I. Addis Ababa* 1939 July 9 Vol. 1 No 2. pp. 101-116 [39 refs.]

This is a long discussion of the well-known theories which have been advanced to elucidate the aetiology of blackwater fever. In summing up the author points to the relationship between malaria and black water even though the malaria be masked or latent and to the influence of quinine in precipitating the attacks. Blackwater is probably a malarial manifestation in persons who are for some reason predisposed and quinine acts as the determining factor precisely because it has a specific affinity for the parasites. This affinity is shown by its power of destroying the parasites if given in curative doses but if given in small doses to subjects infected with parasites particularly resistant it may act as a stimulant to those parasites after the manner of salvarsan on spirochaetes. In other words, blackwater fever may be the result of a specific exciting action of quinine on the parasites, at a certain point in the course of malaria in some instances but the author does not claim that this theory covers all cases.

Three cases are described in detail and a fourth is referred to but no experimental proof is offered in support of the author's theory.

[For a full account of the history and theories of causation of blackwater fever the reader is referred to SCOTT A History of Tropical Medicine, pp. 253-75 see this *Bulletin* 1939 Vol. 36 p. 791]

C IV

THOMAS (Rufus C.) & MILLEX (Robinson M.) A Case of Pregnancy complicated by Blackwater Fever and *Bacillus coli* Pyelitis.—*Trans. Roy Soc Trop Med & Hyg* 1939 Apr 6, Vol. 32, No 6. pp 743-750.

Details are given of a case of pregnancy complicated by blackwater fever and *Bact coli* pyelitis. The patient was a missionary's wife

who had returned to Great Britain from the Congo six weeks previously. She had had several attacks of malaria in the Congo and at least one attack of dark-coloured urine which she had attributed to quinine she had not taken quinine regularly as it upset her. On the 21st May, 1938 she was admitted to hospital with a diagnosis of accidental haemorrhage. She stated that she had had an attack of malaria the previous day for which she had taken 10 grs of quinine. She was at that time in the 36th week of pregnancy. When seen by the authors she was suffering from a typical attack of blackwater fever.

Attention is drawn to the apparent rarity of the occurrence of blackwater fever in pregnant women and it is suggested as an explanation of this that there may be in the blood of pregnant women an increase of haemolytic bodies (presumably a misprint for anti-haemolytic bodies) of sufficient amount to prevent the development of blackwater fever [See GUNTHER below] II Y

GUNTHER (Carl E. M.) Blackwater Fever following the Administration of "Atebrin."—*Med J Australia* 1938 Dec 31 25th Year Vol 2, No 27 pp 1119-1121

The author has collected from the literature a number of records of blackwater fever following the administration of atebrin. He also gives details of a case encountered by himself. The patient had apparently been under the author's observation since 1935. Her last attack of malaria was in November 1935 when she was treated successfully with quinine. On July 27th 1938 she again consulted the author. At this time she was in the fourth month of pregnancy and she was feeling fit and well but the spleen extended four fingers below the costal margin. She had had only three prophylactic doses of quinine during the previous ten days the last being on July 21st. The author ordered a course of atebrin 0.1 gm. thrice daily for five days. She had one dose on July 28th and three doses on July 29th but forgot to take her morning dose on July 30th. At 11 a.m. on that day she had a severe rigor and passed blackwater. II Y

LAFFERRE Fièvre bilieuse hémoglobinurique observée en France, révélatrice d'un paludisme à *Falciparum*. Ankylostomiasis. [A Case of Blackwater Fever observed in France in a Patient with Malaria and Ankylostomiasis.]—*Bull et Mém Soc Méd Hôp de Paris* 1938, Dec. 12. 54th Year 3rd Ser No 33 pp 1700-1702.

Clinical details are given of a case of blackwater fever. After recovery the patient had a relapse of malaria and *P falciparum* was found in the blood. The stools contained hookworm eggs. II Y

CALCUTTA ANNUAL REPORT OF THE ALL-INDIA INSTITUTE OF HYGIENE AND PUBLIC HEALTH 1937 (LAL (R. B.) Director) — [Blackwater Fever pp 23-24] [KRISHNAN (K. V.)]

In the previous year's report the author has drawn attention to certain changes in the blood and tissues met with in blackwater fever and also in malarial haemoglobinuria in monkeys. These changes include focal necrosis of the liver degeneration of the adrenal cortex an excessive production of unsaturated fatty acids a lowering of free-cholesterol and a hypofunction of the reticulo-endothelial system.

Attempts were made to correct these pathological changes and to see how far they would influence the incidence of haemoglobinuria. Treatment of monkeys with glucose ascorbic acid and cortin gave fairly satisfactory results [this *Bulletin* 1938 Vol. 35 p. 479].

During the present year this line of treatment has been extended to human beings, and seven cases of blackwater fever were treated in this manner. The cortical extract used was either a commercial preparation obtained from the Wilson Laboratories in Chicago or an extract prepared by the author following the technique of Swingle and Pfaffner. Both extracts are stated to have given equally encouraging results. The dose used was 1 cc. of the extract (equivalent to 0.1 gm. of fresh gland tissue) twice a day or oftener for about 3 to 5 days. Ascorbic acid was administered in 100 mgm. doses twice daily, glucose was administered intravenously one pint of a 5 per cent solution being given twice daily. The author states that in addition all febrile cases and those showing malaria parasites were given atabrin.

It is claimed that this line of treatment led to the following beneficial results —

"(a) A marked diminution in the intensity of haemoglobinuria. The urine cleared up within one to three days.

"(b) An increase in the quantity of urine passed. Anuria, if present, was overcome.

"(c) Rapid recovery from collapse that is invariably present and improvement in the general condition of the patient. These changes were noticed within 24 hours of the commencement of the treatment.

"(d) Complete recovery of all the seven cases treated.

[Much further evidence will be required to convince the reviewer that these results represent a *propter hoc* and not merely a *post hoc* phenomenon.]

W. Y.

CHOLERA.

PRECIS OF ABSTRACTS IN THIS SECTION

The Eastern Bureau of the League of Nations (p. 892) reports that cholera in the East was generally more than usually severe in 1937-1938. Airports must be regarded as foci of spread. The criterion for notification still remains the clinical one. The question of the El Tor vibrio is discussed. There is no general agreement on the question of the value of prophylactic inoculation.

ROBERTSON and POLLITZER (p. 893) consider that cholera during the last few years has been transported to Shanghai from the valley of the river Yuan, partly because agglutinable vibrios identical with true *V. cholerae* have been isolated from the river water. The water is contaminated from junks and in the process of transporting human night-soil for the use of farmers. Flies play a part in transmission. In control vaccination was used and chlorine to 0.9 p.p.m. was added to the buckets of the water carriers. In transfusion proper sterilization must be ensured and bicarbonate of soda may be added in cases of starvation acidosis in undernourished subjects.

READ (p. 894) has found Wilson and Blair's bismuth sulphite enrichment medium to give the best results in the laboratory in the differential isolation of *V. cholerae* and suggests a field trial.

READ *et al* (p. 895) show that both salt and organic matter are necessary for multiplication and survival of the cholera vibrio and that the presence of other organisms in equal quantity does not prevent multiplication and survival for a time.

BOSE (p. 895) found that the maximum growth of *V. cholerae* on papain-mutton agar occurs in medium in which the papain digestion is continued for 2 hours.

Of 100 strains isolated during the 1933 epidemic in Shanghai FOURNIER (p. 895) shows that all were of Heiberg's group 1 all gave positive cholera red and negative Voges-Proskauer reaction and 74 were non-haemolytic from the outset. The majority 83 were of the intermediate Hikojima type.

Certain changes in morphology metabolic activity and chemical type were found in *V. cholerae* passed through flies by LAL *et al* (p. 896) but fermentation and serological reactions were not altered.

RAYNAL *et al* (p. 896) have obtained a trichloroacetic acid extract from *V. cholerae* which precipitates with anticholera serum, is toxic and antigenic and gives allergic reactions in guineapigs sensitized to cholera.

CHECCAGGI (p. 897) uses this extract for the preparation of a rabbit anti-serum with which the cholera vibrio may be identified.

SEAL and MITRA (p. 897) have investigated the oxidation reduction potentials of *V. cholerae*.

At the Pasteur Institute Shillong (p. 897) attempts at transformation of cholera vibrios failed. Vibrios were almost universally found in natural water sources, but were never agglutinable.

KOESOMADILAGA (p. 898) shows that subpassage in white mice was only possible with *V. cholerae* if blood plate cultures were interposed between every two animal passages. Intraperitoneal injection was not successful but may be so if the El Tor vibrio is used. Blood infection may result for a period of a few hours after intraperitoneal injection or feeding with an emulsion of *V. cholerae*. Intestinal infections took place later than blood infections.

GOYLE (p. 898) advises that tests for haemolysin should be applied after incubation for 24 hours instead of for 3 days, as is usually recommended. Red cells from different animals vary in sensitivity the haemolysin is destroyed by heating and typical cholera immune serum does not neutralize haemolysin though anti haemolysin sera which are all homologous, do so.

BREUWKE (p. 899) contends that the ferments of *V. cholerae* which cause haemodigestion and the liquefaction of gelatin are separate. Haemodigestive power is lost by the El Tor vibrio if cultured on egg medium.

OTTEN (p. 899) points out that the El Tor vibrio is distinguished from *V. cholerae* not only by its haemolytic activity but because it occurs chiefly in persons with symptoms of dysentery in apparently healthy persons and in isolated cases. Investigating the so-called *V. celebicus* he shows that tests of haemolytic power should be as they are not yet carried out according to a standard method, and gives his findings. It remains to be decided whether the Celebes strain is a weakly haemolytic El Tor vibrio a strongly haemolytic cholera vibrio or an independent intermediate species.

MATRA (p. 900) found that the test of inhibition of cholera-phages by vibrio extracts with the precipitin reaction, furnishes two main groups (1) smooth cholera vibrios and the El Tor and (2) a heterogeneous group of water and other vibrios.

MERTENS and MOCHTAR (p. 901) demonstrated the want of serological unity in 32 strains of vibrios of various types.

BOSE (p. 901) uses an extract of crude mannose prepared from ivory nut shavings.

BASERJEE (p. 901) gives details of the pathological appearances in cholera noting the almost constant enlargement of the thymus and degenerative processes in the suprarenal cortex. The clinical type showing renal failure may be due to hypochloræmia rather than dehydration, and the vasomotor failure type is regarded as having an allergic basis which results in increased permeability of intestinal vessels. He suggests that histamine may be absorbed from the intestine causing the profound fall in blood pressure.

CHATTERJEE (p. 902) from post mortem examination finds that in cholera there is surprisingly little inflammatory change in the intestines, being marked in only 30 per cent. He describes the changes in various organs and the bone marrow in which eosinophils amount to 15-20 per cent.

PASRICHA *et al.* (p. 902) investigated the serum reactions of cholera patients. Agglutinins develop about the 4th day and increase H being earlier and stronger than O. They act best on the homologous strain but act also on standard Inaba strain, not on inagglutinable strains. The serological test may therefore help considerably in diagnosis.

POLEFF (p. 903) describes a method for using agglutinating serum on suspected cholera stools themselves.

PASRICHA *et al.* (p. 903) compared 5 treatments applied to patients in strictly serial order and conclude that cholera-phage gave encouraging results justifying its use as a routine measure.

The epidemic of 1937-1938 in Indo-China was introduced from China. GENEVRAY (p. 904) reports that vaccination was performed on 18,513,350 persons usually as a single dose. This was efficacious. The vibrios were of the epidemic cholera type and when freshly isolated could grow in 8 per cent sodium chloride.

GENEVRAY *et al.* (p. 904) describe an epidemic in a village in the Tonking delta. Its origin was obscure but vibrios of the Inaba type were found in two ponds. Vaccination was carried out extensively and to this the authors attribute the sudden end of the epidemic which occurred.

VOGEL and RIOU (p. 905) however have examined the results of vaccination in Tonking and see no advantage in it. Cholera may disappear spontaneously and may attack vaccinated and non vaccinated communities indiscriminately with little difference in mortality.

C IV

LEAGUE OF NATIONS. HEALTH ORGANISATION	EASTERN BUREAU
SINGAPORE. ANNUAL REPORT FOR 1938.	(Disease Incidence)
Cholera in Countries & Ports. pp. 27-60	With 20 graphs &
5 maps [18 refs.]	

Under the heading Cholera in Countries it is noted that cholera in British India has been more severe than the average for the preceding quinquennial period. Cholera in the East generally during

1937 and 1938 seems to have been more than usually severe. In China and French Indo-China it is understandable that the refugee influx into certain territories would be a powerful factor in epidemicity. As in the case of plague airports must be added to seaports as foci of special or even greater danger for the spread of cholera. Notifications from airports in British India were received from Allahabad, Calcutta, Delhi and Jodhpur from Hanoi in French Indo-China and from Hankow in China. Calcutta among the sea ports is credited with having been infected as usual with cholera throughout the year. In connexion with this statement of unenviable invariability for the Hoogly Delta it is interesting to learn that the Commissioner in charge of League of Nations Anti Epidemic Unit 2 suggests that cholera in Central China is endemic.

Many interesting points are raised in this report which are also of the highest importance. The Cholera Commission considered that the criterion to be adopted in notifying proved cases of cholera under the 1926 Convention still remained the clinical one while at a subsequent meeting the Commission expressed the opinion that from the point of view of the sanitary measures to be taken neither the El Tor nor the non agglutinable vibrios can be considered as comparable to the cholera vibrio of Koch. This reference to the El Tor question occurs in the report in a commentary at the end of the paragraph on Cholera in Netherlands India. It has reference to what it has been suggested should be called *Vibrio celebicus* regarded as an El Tor type although with somewhat ill defined characters. A map is also given showing location of El Tor cases in Celebes [See this Bulletin 1939 Vol. 36 pp 374-375].

Another indirect reference to El Tor is the quotation of the view of DOORENBOS on the factors favouring the conservation and regeneration of the cholera vibrio. It has been found at Tor that while vibrios often disappear spontaneously from healthy carriers such is not the case with those carriers who are suffering from dysentery.

Prophylactic inoculation against cholera comes in for a somewhat mixed treatment. Discussions on this point which took place at the meeting of the Advisory Council of the Eastern Bureau at Hanoi and subsequently showed that no unanimity existed in regard to its value during an epidemic or to quote from opinions nearer home TOPLEY and WILSON refer to the difficulty in assessing the value of cholera inoculation in reports which have been published. POLLITZER working in the midst of epidemic cholera in China refers to the distrust which some observers have of statistics tending to prove the value of anti-cholera vaccination and suggests that what is needed is discrimination in regard to statistical evidence rather than general scepticism. Exact interpretation of his opinion would depend largely on the meaning conveyed by the word discrimination.

IV F Harvey

ROBERTSON (R. Cecil) & POLLITZER (Robert). Cholera in Central China during 1938—its Epidemiology and Control—*Trans Roy Soc Trop Med & Hyg* 1939 July 23 Vol. 33. No 2 pp 213-232. With 1 map & 17 figs. on 4 plates.

An account is given of the working of the English-speaking second unit of the League of Nations Epidemic Commission to China in the provinces of Hunan, Hupeh and Kiangsi during 1938 which was a

least 1/5 000 after 2 hours at 37°C. with the laboratory serum. All were found to belong to Heiberg's group I (mannose and saccharose positive, arabinose negative) all gave a positive cholera red and a negative Voges-Proskauer reaction. Out of the 100 strains 74 were non-haemolytic from the outset and 26 had shown some degree of haemolytic action on suspensions of sheep erythrocytes. Any haemolytic property possessed by freshly isolated strains was lost after some months. Each of the strains was tested serologically after saturation of an Inaba Hikojima and Ogawa serum by the heterologous type organisms, and showed that 4 83 and 2 strains were original Inaba, intermediate Hikojima and variant Ogawa respectively. One strain was unclassifiable. This confirms the finding for the epidemic of 1933 where also the intermediate type of vibrio was highly preponderant.

W F H

LAL (R. B.) GHOSAL (S. C.) & MUKHERJI (B.) Investigations on the Variation of Vibrios in the House Fly—*Indian J. Med. Res.* 1939 Jan. Vol 28 No. 3 pp. 597-609

These investigations were undertaken in order to determine whether changes occurred in cholera vibrios after passage through flies, such as might give colour to the view that they existed in a form which was not readily recognizable in an endemic region or in an inter-epidemic period. From the epidemiological point of view this matter is of considerable importance. Great precautions were taken to breed out flies which could be said to be free from infections. This much was certainly effected. The insects were invariably found to be free from contamination with bacteriophage or with organisms even remotely resembling *cholerae*.

The experiments have on the whole, been indecisive and no conclusions have therefore been drawn at this stage. The results may be summarized—(1) Certain changes are described in the morphology of the vibrios and their colonies but no change in fermentation reactions and no change of "O" serological type. (2) Changes in metabolic activity and in chemical type as determined by the methods employed by LIXTON were found in the case of many of the strains recovered from flies.

W F H

RAYNAL (J.) LIEOU (Y. Ch.) & FEISSOLLE (L.) Propriétés biologiques d'un extrait trichloracétique (antigène complet) obtenu à partir du vibron cholérique [Biological Characters of a Trichloroacetic Cholera Extract.]—*Rev. d'Immunologie* Paris 1939 July Vol 5 No 4 pp 317-320

Previous work had shown that a complex unstable compound consisting of polymaccharide and phospho-fatty acid could be extracted with trichloroacetic acid from many gram-negative bacteria. BORVIX and MESROBIANU consider that this represents both endotoxin and somatic antigen. The same technique of extraction has been followed by the authors in the case of the cholera vibrio and a pale yellow liquid obtained. It possesses precipitating action on anticholera serum, toxic action on mouse and rabbit, antigenic and immunizing power in the rabbit and intradermic allergic action in guinea-pigs sensitized intraperitoneally with living cholera vibrios. [See also *Bulletin of Hygiene* 1938 Vol 13 p 748, and 1937 Vol. 12 p. 379.]

W F H

CHECCACCI (L.) Ricerche sulla struttura antigenica del vibrio colerigeno. Nota I. Studio del cosiddetto antigene glucidico in rapporto alla classificazione di Gardner e Venkatraman [Antigenic Structure of the Cholera Vibrio Glyco-lipoid Antigen Constitution and Classification.]—*Boll Istituto Sieroterap Milanese* 1939 June Vol 18. No 6 pp 391-407 [75 refs]
German summary

BORVA and MESROBEANU's method of obtaining a soluble extract of cholera vibrios by means of trichloroacetic acid has been followed and the object of this research is the elucidation of the antigenic properties of this complex phospho-fatty compound with polysaccharide. It has in all probability been identified with the specific O antigen which forms the basis of the classification of vibrios into subgroups by GARDNER and VENKATRAMAN. Intravenous inoculation of the extract in the rabbit produces a serum which specifically agglutinates and precipitates homologous vibrios in high titre and fails to agglutinate except in low titre vibrios belonging to other serological subgroups and the cholera like vibrios. It is usable for the identification of the cholera vibrio in the same way as an O serum with this difference that it manifests its specificity either towards living vibrios or to vibrios killed at 100°C for two hours.
W F H

SEAL (S C) & MITRA (B N) Oxidation-Reduction Potentials of Vibrio cholerae and Related Organisms—*Indian J Med Res* 1939 Jan. Vol 26 No 3 pp 625-630 With 2 graphs & 1 plate

An elaborate combined potentiometer and pH meter was used. It was found that the average potential curves of the organisms belonging to different chemical groups were different from one another. The pH values follow very closely the fall and rise of electrode potential curves. These curves under the conditions of experiment show a fall to a minimum in about 6 hours and then a gradual rise to a maximum in about 30 hours. The fall corresponds to the so-called lag phase of the growth of the organisms and is characterized by having low pH in the medium.
W F H

SHILLONG KING EDWARD VII MEMORIAL PASTEUR INSTITUTE AND MEDICAL RESEARCH INSTITUTE TWENTY FIRST ANNUAL REPORT FOR YEAR ENDING 31ST DECEMBER, 1937 [AHUJA (M. L.) Director] pp 6-10—Cholera Enquiry under the Indian Research Fund Association.

With the closure of the Field Unit at Habiganj in 1937 cholera enquiry at the Institute has been directed to purely laboratory research. These researches are given in some detail and some of them have been already published. Attempts at transformation of agglutinable cholera vibrios to non-agglutinable forms are a fertile subject of research and an endeavour was made to change the Inaba rough strain to the Rangoon Rough which is a smooth but non-agglutinable vibrio of a different type often isolated from cases of cholera. The experiment failed. Other experiments on transformation were directed to keeping an agglutinable vibrio in raw water but the evidence that it changed into an non-agglutinable vibrio was quite unconvincing. The duration of life of the non-agglutinable vibrio as such was short the maximum period of life being 7 days.

Enquiry into the incidence and characters of vibrios in natural water sources extended to 77 samples 54 from tanks and 23 from rivers. These yielded 21 organisms of which 2, 2, 7 and 10 were placed in HÄNDEL'S groups I II III and IV respectively. No example of groups V and VI were isolated. Study along these lines showed that "vibrios are almost universally present in natural water sources" but that "in no instance was an agglutinable vibrio isolated."

Publication of the work on papain-casein medium as a substitute for papain digest mutton in the propagation of bacteriophage has already been abstracted [this *Bulletin* 1899 Vol. 36 p 377] W F H

KOESKOMADILAGA (R. M. R.) Experimenteële cholera-infectie bij witte muizen [Experimental Cholera Infection in White Mice]—*Geneesk Tijdschr v Nederl Indië* 1899 June 27 Vol. 79 No. 23. pp. 1602-1622. [18 refs.]

Much argument has centred around the question whether cholera vibrios are to be found in the blood stream for a time at least, and whether they thus reach the internal organs. Most of the earlier trials negatived this occurrence and it was only later that SANARELLI especially put forward the contention of entry of the cholera vibrio via the fascial ring of lymphoid tissue into the lymphatic and then the blood stream. His contention was that the acidity of the gastric juice and the gastric mucosa constituted an almost absolute barrier to passage of the cholera vibrio. The enterotropic character of the cholera organism was pronounced and independent of the mode of administration whether oral, subcutaneous, intraperitoneal or intravenous. The present author in his own experiments, which are purely animal, has made a departure from custom in using white mice as test animals and he has found them perfectly suitable. He introduced vibrio suspensions by tube into the stomach placed culture material on the tongue and fed his animals with bread soaked in a suspension of vibrios. The results are given with a certain amount of caution, owing to the small number of animals used. He has shown that —

(1) White mice are suitable animals for testing cholera vibrios. (2) Subpassage was proved possible from animal to animal with the El Tor but not with either of the two cholera strains used. Continuity of passage could, however be attained with cholera also if a blood plate culture was interposed between every two animal passages. Subpassage was made from the spleen of the animal. (3) Intraperitoneal injection of El Tor vibrios, after they had been passaged 5 times killed 18 of 30 animals within 24 hours. cholera vibrio injection was without result, except in one case for 20 animals. (4) Intraperitoneal injection of vibrios and feeding with vibrio suspension gave rise to blood infection in 10 minutes and disappearance again after 6 to 10 hours. No general blood infection followed deposition of culture on the tongue or feeding with soaked bread. (5) Intestinal infections took place later than blood infection. W F H

GOYLE (Amar Nath) Observations on Haemolysis by Vibrios.—*Indian J. Med Res* 1899 Jan. Vol. 26 No. 3 pp 611-624.

The vibrio strains tested were all of haemolytic type and their potency as regards production of haemolysin was determined after 2 and 4 hours incubation and thereafter daily up to 10 days. Some

interesting variations of potency were manifest in this series but all the strains showed some degree of haemolytic power after 4 hours. Continued incubation might show diminution of potency and this leads to the conclusion that tests for haemolysin should be applied after 24 hours incubation and not—as is usually recommended—after 3 days. A number of interesting features were determined for the vibrio haemolysin by the quantitative experiments of the author such as that—(1) erythrocytes of different species of animals show varying sensitiveness to haemolysin greatest in the guinea pig about the same in goat sheep and rabbit and least in pigeon monkey horse and man. No correlation could be found between cholesterol or lecithin content and haemolytic sensitivity (2) The haemolysin was filterable in spite of some adsorption in the process. It is completely destroyed in 10 minutes at 56°C and the potency of cultures or filtrates is lost if kept at 37°C. Cold storage preserves haemolysin with or without the addition of 0.5 per cent phenol (3) Anti-haemolysin sera appeared all to be neutralizing and of homologous nature but a typical cholera vibrio immune serum failed to show any neutralizing action

W F H

BEEUWKES (H) Ueber die proteolytischen Fermente des *Vibrio cholerae* und des *Vibrio El Tor* [The Proteolytic Ferments of the Cholera and El Tor Vibrios].—*Zent f Bakt I Abt Orig* 1939 Feb 20 Vol. 143 No 3/4 pp 220-225 With 2 figs [10 refs.]

The property possessed by the cholera vibrio of haemodigestion, where a green transparent sharply defined zone develops around colonies and the property of liquefying gelatin have a certain parallelism which might signify that they were due to one and the same ferment. It has been objected to this view that the properties of all ferments may be influenced by much the same factors and that a parallelism of variation does not justify the conclusion as to identity. The author himself contends that the two ferments are distinct and uses two different cholera strains for a demonstration that they did not individually behave according to expectation in their action on gelatin and on blood, as they should have done if the ferments concerned were identical.

In the same research 4 El Tor strains were investigated for their haemodigestive and gelatin-liquefying characters. The strains were subcultured on agar and preserved on a special egg medium. Liquefying power was estimated by means of the viscosimeter. It was found that the El Tor strains cultured on blood agar exhibited greater liquefying and digesting power than was the case with strains kept on the egg medium. On this latter medium haemodigestive power was lost

W F H

- i. OTTEN (L.) Het cholera El Tor probleem [The Cholera-El Tor Problem].—*Geneesk Tijdschr v Nederl Indië* 1939 Mar 14 Vol. 79 No 11 pp 642-654 [48 refs.]
- ii. — The Cholera-El Tor Problem.—*Meded Dienst d Volksgezondheid in Nederl Indië* 1939 Vol. 28. No 1 pp. 13-21 [46 refs.]
- i The El Tor vibrio problem has been raised anew with the isolation in a small epidemic by DR. MOOR of a haemolytic vibrio. In this

epidemic the patients all had typical cholera symptoms. Now it has to be remembered that the original El Tor vibrio although morphologically and serologically identical with the cholera vibrio makes its appearance for the most part in individuals with symptoms of dysentery in apparently healthy individuals and in the sporadic non-epidemic cholera case. These are features pertaining to the El Tor vibrio as well as its haemolytic activity which so far distinguish it from the cholera vibrio. The epidemic in question occurred on the island of Celebes and the vibrio isolated has been named provisionally *V. celebes*. Otten has examined the characters of this organism in detail and has looked closely into the technique for proving a vibrio to be haemolytic. It is remarkable that the technique for establishing haemolytic character differs rather widely in different hands. Otten has investigated such points as age of bouillon culture, duration of incubation for the production of haemolysis and mode of addition of the testing blood. His conclusions are —

1 (a) The Celebes strains show haemolysis constantly within 24 hours although much more weakly than the typical *V. El Tor* the formed haemolysin is more labile and is absent from 5-day bouillon cultures. (b) This haemolysis is not demonstrable in 3-day bouillon cultures or in 2-day peptone water cultures when culture and blood are incubated together for only 2 hours at 37°C.

2 (a) These phenomena may however be exhibited even by cholera strains, although not regularly and much more weakly than by the Celebes strains the formed cholera haemolysin is even still more labile. (b) No haemolysis occurred, however in cholera bouillon cultures even after continuous incubation at 37°C. if the added blood was first allowed to sink before inoculating the culture.

3 It is very desirable that the haemolysis test should be carried out according to a standard method.

It remains to decide whether the Celebes strain is to be regarded as a weakly haemolytic El Tor vibrio a strongly haemolytic cholera vibrio or an independent species with a position intermediate between the other two.

ii This is a version of the above written in English. IV F H

MAITRA (N. N.) On Inhibition of Individual Types of Cholera-Bacteriophage by Vibrio Extracts.—*Indian J. Med. Res.* 1939 July Vol 27 No 1 pp 41-49

It has been shown previously that extracts of typical cholera and allied vibrios were capable of inhibiting cholera-phage lytic action and that 3 groups of these vibrio strains could be differentiated by the application of these inhibition tests. The present work continues this study and combines it with precipitin reactions. According to previous work it was also found that phage inactivating power is destroyed by the addition of homologous antiserum concurrently with the appearance of specific precipitin reaction. The work now undertaken shows that (1) The test of inhibition of cholera-phages by vibrio extracts, together with the precipitin reaction of these extracts, furnishes two main groups (a) typical smooth cholera vibrios and the El Tor vibrios belonging to "O" subgroup I (b) a heterogeneous group of water and other vibrios. The inhibition and precipitin reactions would seem to depend on a common factor related

to the complex polysaccharide receptor of the cholera vibrio but not to the polysaccharide type as determined by chemical analysis

H F H

MERTENS (W H) & MOCHTAR (A) An Investigation of Vibrios in the Netherlands East-Indies.—*Indian J Med Res* 1939 July Vol. 27 No 1 pp 51-63 [13 refs]

Out of 510 vibrio strains isolated from 20 444 samples of faeces and water 32 were found to agglutinate with an HO cholera serum. These 32 strains were represented by 15 from non-cholera patients 16 from healthy stools and 1 from water They formed along with 10 cholera and 10 El Tor and *V. celebica* control strains the material for study Special anti-sera were made to individual strains and it was found that 17 such sera were still insufficient to classify the 32 strains thus indicating their want of serological unity The conclusions were also reached that anti-O cholera sera are more specifically diagnostic than OH sera and that HEIBERG's fermentative classification is insufficient if used alone

H F H

BOSE (Sarashipada) Note on the Preparation of an Unpurified Mannose Solution for Bacteriological Use.—*Indian J Med Res* 1939 July Vol. 27 No 1 pp 73-74

Mannose a very expensive sugar is invaluable for the classification of vibrios by fermentation methods. The author has obtained an extract of crude mannose from ivory nut shavings—a waste product in button manufacture—which gives the same fermentation results as the pure sugar Three pounds of ivory nut shavings treated by the method described yielded 620 gm. mannose

H F H

BANERJEE (Dhirendra Nath) Outlines of the Pathology of Cholera.—*J Indian Med Assoc* 1939 Apr Vol. 8 No 7 pp 391-395 With 4 figs. on 1 plate [37 refs]

The pathological appearances of some of the organs of the body in cholera cases is referred to in useful detail In the small intestine congestion of both serous and mucous surfaces is a marked feature but whereas the peritoneal coat used to be described as dry this appearance is now seldom seen provided the patient is not allowed to die of dehydration. Peyer's patches especially but also the solitary lymphoid follicles appear prominent. On microscopic examination the characteristic features in the small intestine are extreme necrotic change in the intestinal epithelium distension of the capillaries profound subepithelial oedema and distension of gland tubules with cholera vibrios. It seems probable that the destruction of the epithelial lining of the small intestine is the cause of the great dramatic change which has been almost constantly noted is enlargement of the body fluid and salts into the lumen of the intestine. A pathological change which has been almost constantly noted is enlargement of the thymus possibly because it is a lymphoid organ. On the other hand the spleen is not enlarged and may appear small and wrinkled if death takes place during the stage of dehydration. Reference is made to the pathology of the suprarenals because of the suggested adrenal insufficiency as a factor in the production of the syndrome of cholera. Degenerative changes are to be found in the suprarenal cortex.

GENEVRAY (J) Le choléra en Indochine en 1937-1938. [Cholera in Indo-China, 1937-1938.]—*Bull Office Internat. d'Hyg Publique* 1939 June Vol. 31 No. 6 pp 1024-1040 With 1 chart & 1 folding map

Cholera tends to appear in Indo-China in sharp epidemics with long intervals between. The epidemic of 1928 was the most fatal ever recorded but no cases of cholera have been recorded in Cambodia and Cochm-China since 1934 and in Annam since 1934. Neither Laos nor Tonking have had any cases for 10 years. The present epidemic was introduced from China. Where a country has such an indented coast line and so many creeks, seaport quarantine is almost certain to be ineffective. Water carriage seems to have played but little part in transmission which was from case to case. Although the epidemic was not a severe one in its extent it had a high mortality of 60 to 80 per cent. The symptoms were of ordinary type.

Vaccination measures were applied on a large scale and 13,513,350 vaccinations carried out. Although the majority of these were of the single dose type it is considered that they were efficacious. When full vaccination was carried out, as in the case of administrative and military groups, it gave complete protection from cholera.

Some interesting laboratory investigations were conducted on the vibrios, which appear to have been very uniformly of the epidemic cholera type. The practical superiority of the use of O sera was established. No pseudocholera vibrios were isolated and on only two occasions were cholera vibrios isolated from water. Bacteriophage however was isolated from ponds around which cases of cholera had occurred.

It was found that the freshly isolated cholera vibrio is resistant to high concentrations of salt and can grow in an 8 per cent. sodium chloride. A culture medium which utilized this property was tried out with success and with great saving of time and work. [See also this *Bulletin* 1938, Vol 35 p 742, and 1939 Vol 36 p. 378.]

W F H

GENEVRAY (J) BRUNEAU (J) & SEYERLICH (A.) Etude d'une épidémie de choléra dans un village du delta Tonkinois. [A Cholera Epidemic in a Tonking Delta Village.]—*Bull Soc Path. Exot.* 1939 Mar 8 Vol 32 No 3 pp 232-267 With 2 figs

The interest of this epidemic lay in its sudden occurrence in a small community of not more than 1,200 persons, when no cholera had been notified in the Province for 4½ months and none in the whole of Tonking for 1½ months. It was all over in 15 days but consisted of 60 cases with 52 deaths. The vibrios isolated from the stools in the course of the epidemic were of Inaba type. Other interesting points in connexion with this epidemic were that the only well of the village gave no cholera but vibrios with all the Inaba characters were isolated from two village ponds. Then also there were no carriers found among individuals in the households of patients or even among the cured patients themselves. No trace of bacteriophage could be found to account for the sudden termination of the epidemic or the sudden disappearance of cholera from the village ponds. As 960 vaccinations were performed almost immediately the epidemic broke out the authors conclude that it was this measure which brought the outbreak to so sudden a finish.

W F H

VOGEL (E) & RIOU (M) Les maladies épidémiques endémiques et sociales dans les colonies françaises pendant l'année 1937 Choléra. [Disease in French Colonies in 1937 Cholera].—*Ann de Méd et de Pharm Colon* 1939 Apr Vol 37 Supplement pp 270-286

An account of the ravages of cholera in each of the French colonies is given in some detail. It is a little unusual to find a reasoned statement in an official report which is adverse to the almost universal acceptance of the efficacy of vaccination. The medical officer of the province of Namdinh in Tonking in which 764,500 vaccinations were performed has seen spontaneous arrest of cholera in non vaccinated villages and its recrudescence in vaccinated villages. He considers also that epidemic cholera came to an end in non-vaccinated China at the same time as it did in vaccinated Tonking. In the province of Annam little difference in mortality is manifest between vaccinated and non-vaccinated villages while in the province of Vinh where cholera ceased in the primary focus after a massive inoculation of the population it was found that on recurrence it ravaged indifferently vaccinated and unvaccinated villages. A wise remark on vaccination made in this report is that It is however necessary to be very circumspect in interpreting the results in a favourable as well as an unfavourable sense. H F H

JOURNAL OF THE ASSOCIATION OF MEDICAL WOMEN IN INDIA. 1939
May Vol. 27 No 2 pp 145-147 The Cholera Danger Useless
Vaccines on the Market. Necessity for using Genuine Vaccine.

There is no doubt of the existence of very numerous cholera like organisms and much time and care has been devoted to defining the characters of the true cholera vibrio. As there is some possibility that the latest research work on the subject is not known to all purveyors of cholera vaccine three of the main Government laboratories have undertaken to issue suitable strains to laboratories and commercial firms for the preparation of vaccine. IV F H

GAUDUCHEAU (A) La vaccination anticholérique en Indochine [Anti Cholera Vaccination in Indo-China].—*Bull Soc Path Exot* 1939 May 10 Vol 32. No 5 pp 471-473

CALCUTTA ANNUAL REPORT OF THE CALCUTTA SCHOOL OF TROPICAL MEDICINE AND THE CARMICHAEL HOSPITAL FOR TROPICAL DISEASES 1938 [CHOPRA (R. N.) Director].—[Cholera [DEMONTE (A. J. H.)] pp 121-132. With 2 charts.]

EPIDEMIC DROPSY AND DEFICIENCY DISEASES

PRÉCIS OF ABSTRACTS IN THIS SECTION

RAY and GANGULY (p 907) have established a normal in the urinary constituents of Bengalee subjects. Compared with Americans and Europeans this shows that the average diet is poor in protein. They followed up this work by investigations in epidemic dropsy in which

the urine shows increased uric acid reduced chlorides and reduced inorganic phosphorus, the latter constituting a good diagnostic sign.

LAL (p 907) describes an outbreak of epidemic dropsy confined to a group of servants who messed together. Others in the household were not affected, though in close personal contact. All available evidence incriminates mustard oil, but the toxic component is not known. From careful work, LAL, AHMAD and ROY (p 908) conclude that allylisothiocyanate present in mustard oil is not responsible for the symptoms of epidemic dropsy.

LAL and ROY (p 909) give details of 8 outbreaks. They tested mustard oil used in 3 of these, using sound oil as control and volunteers using two of these oils, but not the third, developed epidemic dropsy. This evidence tends to confirm the mustard oil theory but CHOPRA *et al.* (p 909) produce evidence that symptoms indistinguishable from those of epidemic dropsy can be produced in man by the consumption of mustard oil to which has been added oil from the seeds of *Argemone mexicana* but not by mustard oil alone. The toxic principle is destroyed by heating to 240°C. and the argemone seeds bear some resemblance to those of the mustard plant. LAL *et al.* (p 910) have elaborated two chemical and two physical tests which indicate disease-producing mustard oil. The seeds of *Argemone mexicana* impart the physical and chemical properties of toxic oil to mustard oil and from argemone oil and toxic oil, but not from pure mustard oil, a white crystalline substance has been isolated which responds to the differential tests. This will be tested for toxicity.

SINGHA (p 911) describes the symptoms of an anomalous type of epidemic dropsy in which an acute cardiac crisis, without dropsy occurs. Cyanosis and dyspnoea occur and the prognosis is bad. Treatment is unsatisfactory.

In nutritional oedema SHUKRY *et al.* (p 912) found hypochromic anaemia hypoproteinaemia, reduced blood cholesterol and rise in chloride content of the oedema fluid—conditions found in animal experimental starvation oedema.

Vitamin deficiency, particularly vitamin C is regarded by TROLLE (p 912) as the principal cause of a syndrome seen in African children characterized by severe anaemia, loss of pigment especially in the hair oedema and bleeding from the gums. Ankylostomiasis is often present and must be treated, but the essence of treatment is a generous diet. VAN DAELE (p 913) in the Congo describes the condition Buaki which resembles this syndrome in many respects, though in Buaki there is no stomatitis. It responds to the administration of a well balanced mixed diet, and is thought to be due to excess of carbohydrate and lack of protein and vitamins. POUHIN (p 913) describes a syndrome of oedema, sometimes with nervous symptoms, in Morocco. The diet of the inhabitants is low in animal protein, and the most successful treatment is the addition of meat and lemons.

VIDAL (p 914) describes a mixed avitaminosis in children showing oedema of the legs cyanosis, inflammation of the lips and gums and erythema. Gastro-intestinal disturbance is common. The condition resembles pellagra in some respects and other deficiency diseases of children. Ankylostomiasis is not a factor.

DEBDAS (p 914) records children who after long periods of diarrhoea developed purpuric symptoms and calls attention to the necessity of administering orange juice to ensure a sufficient supply when diet is restricted and elimination in frequent stools, is rapid.

RAY (S N) & GANGULY (R.) Urinary Composition of Normal Bengalee Subjects.—*Indian Jl Med Res* 1938. Oct Vol 26 No 2. pp 459-463 [13 refs.]

With a view to accounting for urinary conditions and constituents in disease it is important to have a standard which may be regarded as normal for comparison. The authors have tried to establish this in Bengalees by analyses of 24-hour specimens from middle class Hindu Bengalees male and female between the ages of 16 and 28 giving a history of good health during the preceding two years. In the original paper a table is given comparing the findings with those in Americans and Europeans. The two latter show closely approximating results one to the other but in certain particulars differ markedly from the Bengalee analyses. Thus urea excretion in the Bengalees was only 4.3 gm. in 24 hours (average of about 50 persons) as compared with 31.5 and 30 in Americans and Europeans respectively and total nitrogen 4.83 as compared with 16.8 and 16.0 inorganic sulphates were 0.65 gm. as compared with 3.27 and 2.92 gm. Calcium excretion was also low 0.06 as compared with 0.17 and 0.15 respectively. It is curious to note that the excretion of uric acid 0.7 gm. is equal to that of the European and higher than that of the American 0.64 while chloride excretion (17.4) is higher than in Americans (10-15 gm.) Neutral sulphates were the same 0.18, 0.18 and 0.17 respectively and ethereal sulphates 0.1, 0.19 and 0.22. These figures indicate that the average Bengalee diet is poor in food protein about 35 gm of protein only per day well below Chittenden's minimum.

H H S

RAY (S N) & GANGULY (R.) Observations on the Metabolic Activity of Patients suffering from Epidemic Dropsy Part I. Urinary Composition of Epidemic-Dropsy Patients.—*Indian Jl Med Res* 1938. Oct Vol 26 No 2. pp 465-468

Following up their analyses of normal urinary constituents in Bengalees (see above) the authors have turned their attention to pathological conditions and deal first with epidemic dropsy. The chief alterations as shown in a table were an increase of uric acid excreted 0.94 as compared with the normal 0.7 gm. a reduction by about one third in chloride (11.4 as compared with 17.4) and a reduction of inorganic phosphorus to one-sixth 0.11 as compared with normal 0.68. The ethereal sulphate was not altered a fact which militates against the idea that the cause is an intestinal bacterium or bacterial toxin at all events of a phenolic nature.

The increase of uric acid in epidemic dropsy had been previously noted and is ascribed to disturbance of the cell nuclei. The low excretion of inorganic phosphates may be utilized in the authors' view as a sign of diagnostic value in suspected cases. The lowered output of chlorides is due to retention for the diet was the same this is corroborated by finding increased concentration of chlorides in the blood during an attack of epidemic dropsy.

H H S

LAL (R B) Further Studies in Epidemic Dropsy.—*Calcutta Med Jl* 1938 Sept. Vol 34 No 3. pp 169-182. With 2 plans & 3 figs. on 2 plates.

CALCUTTA MEDICAL JOURNAL. 1938. Sept. Vol 34 No. 3 pp 218-221.—The Epidemic Dropsy Problem.
Dr Lal who is probably the best authority on this condition at the present day having done much experimental work and epidemiological

resembling those of epidemic dropsy following consumption of mustard oil adulterated with *sialkata* or *katakar* oil argemone oil [see this Bulletin 1927 Vol 24 p 238] and two years later KAMATH reported the Ganjam outbreak where *odismari* seeds were implicated [this Bulletin 1929 Vol. 28 p 355]. More recently the work of LAL, ROY and GHOSAL has thrown fresh light on the question [this Bulletin 1938 Vol. 35 p 312].

In oils obtained from houses where there had been cases of epidemic dropsy positive reactions for argemone oil were obtained, and *odismari* seeds were shown to be seeds of *Argemone mexicana*.

Volunteers were divided into three groups. For one the food was cooked in pure mustard oil to which known quantities of argemone oil were added for the second the food was cooked in samples of oil giving argemone oil reactions and implicated in natural outbreaks of the disease the third group had a similar diet but the food was cooked in mustard oil giving no reaction for argemone oil. The results of the experiments are given in two protocols. Some of the symptoms of the disease appeared in those receiving argemone oil which seems to have a cumulative effect provided a certain quantity is taken the symptoms appear after an interval though consumption of the oil is stopped. Its toxic principle is destroyed by heating to 240°C. not at 150°C.

The authors conclude that ingestion of the oil expressed from the seeds of *Argemone mexicana* can produce the symptoms of epidemic dropsy, but

Whether the condition produced is identical or not with the naturally-occurring epidemic dropsy cannot be definitely said at present, but there is no doubt that the use of oil containing argemone oil is harmful to man. There appears to be little doubt that consumption of adulterated oil produces symptoms which cannot be distinguished from those encountered in the naturally-occurring disease.

From the evidence available it appears that the adulteration of mustard oil with argemone oil may or may not be intentional on the part of those who grow the mustard plant, or of those who express or sell the oil. The plant *Argemone mexicana* is widespread, its seeds bear a superficial resemblance to mustard seeds and may be harvested along with them. It is possible that, because oil can be obtained from the seeds of this plant, efforts are not made to exclude these seeds in the harvesting of mustard seeds.

H H S

LAL (R B) MUKHERJI (S P) ROY (S C) & SANKARAN (G)
Investigations into the Epidemiology of Epidemic Dropsy Part VIII. Studies on the Nature and Origin of Certain (?) Toxic Substances Present in the Supplies of Mustard Oil associated with Outbreaks of Epidemic Dropsy—*Indian J. Med. Res.* 1939 July Vol 27 No 1 pp. 207-224 With 7 figs on 2 plates.

In pursuance of their work on epidemic dropsy the authors on the assumption that the cause is to be found connected with the mustard oil used carried out investigations to determine the offending constituent. Their first step was to discover some tests which would distinguish sound from disease-producing oil. They found two chemical and two physical tests. The chemical are (1) The Nitric Acid test. When a little of the oil is vigorously shaken with an equal quantity of concentrated HNO_3 , in the case of toxic oil a brownish red colour develops in the bottom acid layer. (2) The Cupric Acetate

test If a mixture of the oil acidified with glacial acetic acid and 3 per cent solution of cupric acetate be heated in a water bath for 15 minutes, in the case of a toxic oil a precipitate forms and the colour of the watery layer changes from blue to green. The physical tests are (1) Spectroscopic Whereas the general nature of the spectrum is the same in toxic and non toxic, the latter show a broad absorption band between 2,900 and 2,600 A.U. with maxima near 2,750 (2) Fluorescence on exposure to ultra violet rays absent in sound oils

Results of these tests are given in the subjoined table —

Test		Epidemiological history and toxicity positive (class I)	Epidemiological history and toxicity negative (class II)
Nitric acid test	{ Positive	21	2
	{ Negative	2	21
Cupric acetate test	{ Positive	31	0
	{ Negative	2	23
Fluorescence test	{ Positive	22	11
	{ Negative	1	12

The authors next set out to determine whether the poisonous effects were due to deteriorated mustard seeds to adulteration of the oil or adulteration of the seeds They found that seeds of *Argemone mexicana* which resemble the black mustard seed *Brassica napus* impart the physical and chemical properties of toxic oil to mustard oil, and either accidentally or by deliberate adulteration these find their way into stocks of mustard seed and the expressed oil is present in sufficient amount in the final product to cause the symptoms observed in the outbreaks of epidemic dropsy Further from oil of *Argemone mexicana* and from a proved toxic oil (but not from pure mustard oil) a white crystalline substance has been isolated which responds to the differential tests. Study is to be undertaken to determine whether this is the actual toxic substance.

H H S

SINHA (B C) Some Special Clinical Aspect of Epidemic Dropsy and the Limitations of its Treatment.—*Trans Med College Re-Union Calcutta* 1938-39 Vol. 2. pp 81-84

The author has lately had under observation patients suffering from epidemic dropsy of an anomalous type in short epidemic dropsy, without dropsy but with acute cardiac crisis. The first observed symptom is usually intense dyspnoea of sudden onset but enquiry reveals cases of epidemic dropsy in other members of the family. Cyanosis is present but not very marked. All show some degree of cardiac enlargement, with more or less tumultuous action but without irregularity the pulmonary second sound is accentuated and there may be a soft systolic murmur at the apex Pulse is 100-140 regular of low tension blood pressure 100-130 mm systolic, 50-70 diastolic. The liver is enlarged and tender The prognosis is grave four patients referred to in this article all died within 3-4 days

The cause of the dyspnoea is discussed, whether central or due to impending ventricular failure. Treatment is very unsatisfactory and disappointing. Patients gain some ease by being propped up in bed and by injections twice daily of 1 cc. luminal and 1/100 grain of atropin. Venesection and abstraction of 8-10 oz. daily for 2-3 days may relieve but not after the first few days. Inhalation of oxygen gave no relief. Ephedrine and adrenaline were without effect, digitalis and strophanthine made no impression when there was tachycardia. Glucose proved useless. Sleeplessness was a troublesome symptom which was unrelieved by the usual hypnotics. H H S

SHUKRY (H.) MAHDI (M. A.) & EL GHOLMY (A. A.) Nutritional Oedema in Children in Egypt.—*Arch Dis in Childhood* 1938. Sept. Vol 13 No 75 pp. 254-257 [Summary appears also in *Bulletin of Hygiene*]

The authors have investigated eighteen cases in Egypt, children ranging in age between $1\frac{1}{2}$ and 10 years, suffering from gastrointestinal disorder with oedema. Theoretically oedema develops when (1) the colloid osmotic pressure of the plasma becomes less than that of the cellular fluid (2) there is increased permeability of capillary endothelium to salt and water and (3) abnormal mechanical forces are acting.

In all but three the total serum protein was 4.5 per cent. or less, i.e. the critical level of experimental oedema. The chlorides showed an increase of 120 mgm per cent or more in one case 482 mgm difference between the blood and oedema fluids, instead of the usual 50 mgm per cent higher in the cellular spaces. A table of detailed findings demonstrates an almost constantly present hypoproteinaemia and the increased chloride content of the oedema fluid. By experiments on dogs the authors concluded that the return of serum protein to normal level is probably determined not only by adequate diet but also by the time needed for restoration of the activity of the liver and other tissues concerned with protein synthesis. Enlargement of liver with marked pallor and cellular changes were observed after death in some of the cases.

All the eighteen patients had definite hypochromic anaemia, hypoproteinaemia, reduced blood cholesterol and rise in chloride content of the oedema fluid—conditions found in animal experimental starvation oedema. H H S

TROLLE (G.) Syndrome oedémateux cutané et dyschromique. Note préliminaire d'après les médecins du Forearm. [Oedema and Depigmentation of the Skin and Cutaneous Structures.]—pp 37-57 With 1 fig 1938. Brussels Fonds Reine Elisabeth pour l'Assistance Médicale aux Indigènes du Congo Belge 112 rue du Commerce

The syndrome described in this article goes by the local names of Mbwagi kikuba, and kibengi (from bengi—to grow white) or by the French doctors, cheveux blancs. The established disease is characterized by oedema of the integument causing a waxy appearance by severe anaemia, loss of pigment in the hair weakness, articular pains bleeding from the gums and, in some cases, enlargement of the spleen. Children are mostly attacked of 1450 cases 1085 (75.5 per

cent) were children 211 were adult female and 44 men many of the children were still being breast fed.

The following is a more detailed account of the symptoms and course of the disease the onset is gradual with loss of appetite this is followed by marked weakness pallor of skin and hair the skin becoming lemon yellow dry and scaly haemic murmurs develop with foetal cardiac rhythm the liver enlarges red cells 3 000 000 or so haemoglobin 60-70 per cent white cells 6 000-8 000 with relative lymphocytosis and an Arneth index deviated to the right no marked eosinophilia recession of the gums with alveolar periostitis in the later stages cardiac signs increase the abdomen enlarges and the face is swollen and puffy and the hair becomes less and less pigmented. The fatality rate is in the neighbourhood of 15 per cent Some are infested with hookworms but the general opinion is that the cause is a vitamin deficiency in particular vitamin C Treatment is mainly based on these lines—clearing up the ankylostomiasis if present giving a generous diet rich in vitamins and cardiac and general tonics

H H S

AN DALE (G) Sur une affection de carence et de déséquilibre diététique observée au Congo (Buaki des indigènes) [Buaki, a Deficiency Disease in the Congo]—*Ann Soc Bde de Méd Trop* 1938 Dec. 31 Vol. 18. No 4 pp 653-669

Among the inhabitants of many villages in certain parts of Kwango (Congo) some proportion may be immediately picked out as suffering from an affection giving rise to a very characteristic appearance a dull dry rough scaly or nutmeg grater like skin with general loss of pigment of varying degree desquamation of the skin of the palms and soles the hair thinned lank and depigmented with perhaps patches of alopecia loss of weight and muscular wasting sometimes cachexia the face puffy the lower extremities oedematous as also the genitalia a distended abdomen with moderate ascites and sometimes mild diarrhoea perianthicular rheumatic pains and marked anaemia complete the picture On the other hand there are no signs referable to the nervous system or special senses no visceral or bony lesions no other gastro-intestinal symptoms no stomatitis no albuminuria. The affection is recognized by the natives and called Buaki. It affects women and children, chiefly the forsaken wife or the orphan very rarely a male this incidence at once suggesting that it is a condition due to dietetic deficiency The diet at best consists of manioc with a minimum of maize and ground nuts rarely bananas beans and fruits are hardly known meat is never eaten and the only supplements may be insects small animals roots and a little palm wine. The condition does not respond to an exhibition of vitamins but improves when a well balanced mixed diet is given. It is therefore considered to be due to an unequilibrated diet in which there is an excess of carbohydrate but lack of protein probably in association with vitamin insufficiency

H S S

POUHIN (E) Syndromes d'oedèmes par carence alimentaire dans le cercle de Zagora (Maroc) [Oedema from Diet Deficiency in Zagora (Morocco)]—*Bull Soc Path Exot* 1939 July 12. Vol. 32. No 7 pp 769-779

The author during a residence of 2½ years in the district saw several cases of oedema due to more than one cause. Some seemed to

malarial in origin and cleared up when quinine was given others were due to insufficient food—a famine oedema, others again to debility following typhus, and a fourth class ascribed to imbalance of diet. Only four showed any nervous symptoms, two with polyneuritis of the legs and flaccid paraplegia and two with polyneuritis of one side affecting mainly the extensors. All four recovered, two of them promptly on being given vitamin B₁.

Analysis of the diet of the inhabitants of Draa shows a definite reduction of animal proteins below the amount necessary for adequate nutrition and as for vitamin content—dates were the main source—100 gm yielded 200 units of vitamin A 30 I.U. of B₁ traces only of B₂ and no C or D (sometimes traces of the last). Administration of synthetic vitamin had little effect, the most successful treatment was addition of meat and lemons. H H S

VIDAL (Antonio) Avitaminosis compleja infantil [Mixed Avitaminoses in Children].—V Congreso Médico de Centro América y Panamá 6 pp With 5 figs.

The chief symptoms of the condition described [as occurring in Honduras?] are oedema of the legs, and involving sometimes the arms and face coldness of the extremities with cyanosis, congestion perhaps inflammation of lips and gums—*signo del colorote* (the rouge sign)—and in some a certain degree of stomatitis. An erythema of the legs may extend over the abdomen and nates and even to the arms. It resembles pellagra in being symmetrical and in severe cases desquamation may continue for weeks or even months. As in pellagra too there occur attacks of gastro-intestinal disturbance with diarrhoea in nearly all cases. Bleeding from the gums is sometimes seen, and conjunctivitis and xerosis. The blood shows little change beyond a moderate anaemia and reduction of haemoglobin. The oedema is not due to ankylostomiasis. Those affected are of the poorer classes, living in unsanitary conditions, on a diet consisting largely of maize. There is considerable resemblance to the *calebrilla* of Mexico [see this Bulletin 1937 Vol 34 p 247 and Bull of Hyg 1935 Vol 10 p 806] and kwashiorkor of the Gold Coast [see this Bulletin 1934 Vol 31 p 344 and Bull. of Hyg 1936, Vol 11 p. 311].

The present article records 15 patients, of ages ranging between 15 months and 6 years, but it is said to be most common between two and four years. Sex seems to play no part of these 15 eight were boys and seven were girls. Five died three males and two females. If coming under observation in time they did best on a generous diet of milk eggs green food, tomato-juice and for medicine calcium lactate. H H S

DEBDAZ (Nanigopal) Secondary Purpura in Chronic Diarrhoea in Children due to Hypovitaminosis-C.—*Calcutta Med. J.* 1939 May Vol 35 No. 5 pp 394-396

Three cases are recorded of children who after troublesome diarrhoea over periods of 6 to 12 weeks developed purpuric symptoms. The author ascribes this secondary purpura to two causes first that on account of the diarrhoea the diet was restricted and vitamin C deficient, and, second, that what was ingested was rapidly got rid of in the frequent motions. It is important, therefore in such cases not to keep

too much or too long to starchy foods and to give vitamin C as orange-juice the amount needed of the latter is not sufficient to aggravate the diarrhoea.

H H S

SEQUEIRA (James H) Cutaneous Manifestations of Vitamin Deficiency
—*East African Med J* 1933 July Vol. 15 No. 4 pp 96-110
With 4 figs. on 2 plates. [23 refs.] Discussion pp 110-115

MALARIA.

PRÉCIS OF ABSTRACTS IN THIS SECTION

COVELL (p 917) has given a full account of the history of malaria in Delhi.

Two persons reported by TANGUY (p. 917) contracted malaria near Fréjus in the French Riviera

HÉRIVAUX *et al* (p 918) have studied malaria in the New Hebrides. The form is mild but *P. falciparum* is the most common parasite. There is a marked relationship between malaria and rainfall, suggesting seasonal breeding of *A. punctulatus* the only Anopheles found which is found to have very catholic habits. Eradication of this mosquito might be comparatively easy

MISSIROLI (p 919) discusses the nomenclature of *P. falciparum* and GIOVANNOLA (p 919) concludes that *P. tenue* is not a valid species

ROUBAUD (p 919) shows that exceptional individuals of *A. maculipennis labranchiae* usually markedly anthropophilic may show zoophilic tendencies. In Portugal, CAMBOURNAC (p 920) found larvae of *A. maculipennis atroparvus* generally spread throughout ricefields but more numerous when there was growth of the alga *Spirogyra*. There is considerable mortality in each larval instar. WEYER and BOCK (p 920) found a higher mortality in infected than in non infected mosquitoes. *A. maculipennis* transmits *P. vivax* better than *P. falciparum* the latter being best transmitted by *A. superpictus* among the Anopheles used and giving an infective index of 81 per cent. PORTER and HOCKING (p 921) have devised an apparatus for testing the effect of insecticides on flying insects and from which samples of air can be removed for examination.

BOYD *et al* (p 922) showed experimentally in man that current or recent infection with either *P. vivax* or *P. falciparum* in no way interferes with successful infection with the other

The injection of non-specific protein (e.g. milk) is considered by SCHLESINGER (p 922) to cause the coarsening of granulations existing in the blood cells thus rendering them visible. In a proportion of patients with latent malaria this procedure caused typical Schüffner's or Maurer's dots to appear

LENTJES (p 923) reports that in fresh benign tertian infections 0.6 gm hydrochloride of hydroquinone daily for 7 days is superior to quinine. It cuts short the attack promptly inhibits the production of gametes diminishes relapses and has little toxicity. HAVER (p 923) quotes a patient in whose family hypersensitivity to quinine in the form of general urticaria has been present through three generations

CIUCA *et al* (p 924) show that quinine and atabrin even if combined with plasmoquine do not prevent the appearance of gametocytes

but a single dose of 2 cgm. plasmoquine will eliminate existing gametocytes as effectively as large daily doses. It is therefore logical to give this dose 3 or 4 days after completion of a course of schizonticidal drugs and to repeat it at intervals of 5 days.

During atebirin treatment BOCK (p. 924) has noted clumping followed by extrusion of the pigment, solution of the cytoplasm and shrinking and breaking up of the chromatin. The effect is therefore apparently directly on the parasites. KOSTIĆ and ANTIĆ (p. 924) gave 0.4 gm. atebirin each week to a carefully observed group of prisoners and warders in Yugoslavia. This dose was divided between two successive days. The infection rate diminished, there were no ill-effects and all continued at work whereas in the controls the infection rate increased considerably.

SIXTOX *et al.* (p. 925) come to the conclusion that prosectazine appears to have a true causal prophylactic action against the sporozoites or forms between sporozoite and trophozoite, of the strain of *P. falciparum* used in careful experiments on 8 patients.

MACDONALD (p. 926) has designed a cheap effective syphon for the automatic flushing of streams in the control of *A. culicifacies* breeding in Ceylon. In Freetown the investigations of PEASTON and REXNER (p. 926) indicate that an area hyperendemic in 1926 has been converted to a condition of endemicity like that of the rest of the town probably owing to the permanent canalization of a watercourse and drainage into it.

Malaria of monkeys and birds—Using an antigen prepared from the paritized red cells of monkeys dying from *P. knowlesi* infection EATON and COGGESHALL (p. 926) observed strong complement fixation with sera of persons infected with *P. knowlesi*, *P. vivax* or *P. falciparum*. The reaction is therefore group specific. MOSKOW (p. 927) shows that immune bodies are developed in the serum of monkeys with *P. knowlesi* infection, which when injected in large quantities into others at the time of infection modify the disease to a chronic rather than immediately fatal, infection.

RODMAN *et al.* (p. 928) failed to infect man and other monkeys with the parasite of chimpanzees which resembles *P. vivax*. They therefore consider it to be a distinct species. BRUMPT (p. 928) considers that the three plasmodia of chimpanzees which resemble the three common parasites of man, are probably on morphological and pathogenic grounds, distinct from the latter. One is known as *P. reichenowi* and he suggests that the others be named *P. schreineri* and *P. rodhaini*.

RECHAUD *et al.* (p. 928) find that *Aedes gressittii* permits complete development of *P. gallinaceum*.

HEWITT (p. 929) shows that the blood of fowls infected with *P. gallinaceum* by means of mosquitoes is not itself infective for 4 or 5 days.

HEWITT (p. 929) confirms the finding that young *P. cathemerium* parasites enter young red cells only, both reaching maturity at about the same time except during the crises when exceptionally young red cells are present and are attacked.

GAVERILOV *et al.* (p. 929) found that *P. gallinaceum* survived for 10 days in culture of bone marrow but failed to do so in fowl spleen tissue culture.

HECKER and WOLFSON (p. 929) failed to separate erythrocytic and exoerythrocytic schizonts by means of tissue culture of infected brain, lungs and spleen, and inoculation into birds.

GIOVANOLA (p 930) considers the toxoplasma like bodies seen in *P. gallinaceum* infections of fowls to be stages in the development of that parasite and calls attention to two inclusions probably parasitic in the mononuclear blood cells. CHOKTIS (p 930) considers that exoerythrocytic schizonts are forms which develop abnormally after ingestion of young parasites by the reticulo-endothelial cells the latter showing some loss of function. The reticulo-endothelial system shows marked proliferation in *P. gallinaceum* infections. RAFFAELE (p 931) suggests that the exoerythrocytic schizonts of birds may give rise to two kinds of merozoites one for continuance of exoerythrocytic development the other for initiation of erythrocytic development. A similar cycle may occur in man.

Only the exoerythrocytic schizonts in *P. gallinaceum* infection give a definite reaction by Feulgen's method according to UNGO-MUGDAN (p 931).

Mosquito transmission was responsible for an outbreak of *P. relictum* infection in penguins in Antwerp and RODHAIN (p 931) found exoerythrocytic schizonts in these birds and in another infected by inoculation. These schizonts are more resistant to atebrian than the ordinary parasites.

DÉMINA (p 932) studied the natural resistance of birds to *P. relictum*.

MOSEKOVSKY and SYRKINE (p 932) found that certain acridine compounds active against bird malaria cause the appearance of small granules in the red cells of mice and birds.

DURAND and VILLAIN (p 932) failed to influence infection in pigeons with *Haemoproteus columbae* by the use of sulphanilamide derivatives.

C IV

COVELL (G) Antimalaria Operations in Delhi. Part I.—*Jl Malaria Inst of India* 1939 Mar Vol. 2, No 1 pp 1-61 With 6 maps (1 folding) 1 chart & 26 figs on 13 plates. [20 refs]

This part of the report contains a detailed account of the history of malaria in Delhi of the nature of the malaria problems in different parts of the Delhi urban area and of the distribution and intensity of malaria infection in Delhi in 1896 when the last antimalaria campaign was started. Clear maps good photographs of different types of anopheline breeding places abundant tables giving weekly climatic data for seven years morbidity data, mortality data and spleen rates recorded by different observers between 1909 and 1896 supplement the letterpress. It is an unusually fully documented report and in consequence does not lend itself to summary in small space.

Norman White

TANGUY (Y) Observation de paludisme contracté en France (Saint Aygulf) (Malaria contracted in France)—*Bull Soc Path Exot* 1939 Mar 8 Vol. 32, No 3 pp 285-296

This is a brief note concerning a patient who acquired a *P. vivax* infection in the south of France. She had never been outside France and never visited any place where malaria is endemic. During three years she passed some of the summer months in Saint Aygulf in a house one and a half kilometres distant from the military camp at

Fréjus in the Riviera. During the last of these visits in 1937 she contracted malaria. Her husband appears to have contracted the disease at the same time. V II

HÉRIVAUX (A.) ROYER (P.) & DAO VAN THAI. Contribution à l'étude du paludisme des Nouvelles-Hébrides. Recherches effectuées à Port Vila et alentours [Malaria in the New Hebrides. Investigations in Port Vila and Neighbourhood.]—*Ann de Méd et de Pharm Colon* 1939 Jan.-Feb.-Mar Vol 37 No 1 pp. 40-62 With 6 graphs.

This report is of special interest because apart from BUXTON'S Report (this Bulletin 1927 Vol. 24 p. 841) on the Islands of the Southern Pacific no precise information has been published about malaria in the New Hebrides. From the malaria point of view the New Hebrides are of special interest because they mark the limit of extension of indigenous malaria in the Pacific to the south and east. In Fiji and New Caledonia, relatively so near to the New Hebrides as distances go in the Pacific, indigenous malaria is unknown.

The years observations recorded were carried out in and around Port Vila in the Island of Vati the chief island of the group. Vati has 2,800 inhabitants half of whom live in Port Vila. There are 1,600 belonging to the indigenous Melanesian race, 500 Europeans, French and English, and 700 Asiatics. Not all are of pure descent. There are numerous half-castes especially among the French population. The authors refer to the mixture of blood as a 'cocktail of blood'.

In the French Hospital at Port Vila of 3,102 patients treated during 1937 (both in-patients and out-patients) 604 were suffering from malaria. The disease occurs in mild form and is hardly ever fatal, even among infants. It is very amenable to treatment. Pernicious attacks are very rare. There were two in 1937 both among natives. Haemoglobinuric cases occur from time to time chiefly among Asiatics, but even these cases are rarely fatal.

Parasites were found in 307 cases during the year. *P. falciparum* was found in 242, malar in 61 both in 4. *P. malariae* was never seen. Of 129 school-children aged 5 to 12 examined, 47 had palpable spleens, a spleen rate of 36.4 (not 42.7 as printed in error). The spleen index of 158 members of the labour force community of Tonking origin, in the neighbourhood of Port Vila was 69.23 per cent.

The study of indigenous malaria is complicated by the arrival three or four times a year of batches of labourers from Tonking for work on the French plantations. After a short period of observation at Port Vila these workers are distributed throughout the islands, a considerable number each time remaining in Vati. Numerous attacks of acute malaria are commonly observed among them for a month or two after their arrival unless they happen to arrive in the cool season.

Indigenous malaria of local origin is almost non-existent during the three cool months. July to September rises with the advent of the hot weather and is at its worst towards the close of the hot season when daily variations in temperature are most marked, generally in the month of May. There appears to be a marked relationship between the incidence of malaria and rainfall, a fact which would indicate that the most important anopheline breeding places are temporary and seasonal. This conclusion was confirmed by the observations made.

The only Anopheline was identified by Buxton 14 years ago *A. punctulatus*. No other has been found. The author's observations indicate a marked catholicity in its breeding habits. Larvae have been found in shade and in full sunshine in stagnant and in running water in clear and in muddy waters in large marshes and in small puddles in small artificial collections of water in fresh and in very saline water. It is a domestic mosquito profiting by household negligence. Adults do not appear to fly far. Its eradication might be neither difficult nor costly. A II

MISSIROLI (A.) *Plasmodium immaculatum* Grassi e Feletti (1892) Schaudinn (1902) nome corretto del parassita della terzana maligna. [*P. immaculatum* Correct Name of the Parasite of Malignant Tertian Malaria.]—*Riv di Parassit* Rome 1933 Dec. Vol. 2. No 4 pp 269-273 English summary (6 lines)

In this paper the author reviews the early papers of Grassi and FELETTI dealing with the parasites of human and avian malaria. He concludes that the correct name for the parasite of avian malaria is *Plasmodium praecox* Grassi and Feletti 1890 *P. relicti* being a synonym while that of the human parasite is *Plasmodium immaculatum* Grassi and Feletti 1892 with *P. falciparum* as a synonym [see also this *Bulletin* 1939 Vol. 36 p 390] C M Henyon

GIOVANNOLA (Arnaldo) Ceppi tropicali e ceppi europei di *Plasmodium immaculatum* [Tropical and European Strains of *P. immaculatum*]—*Riv di Parassit* Rome 1933 Dec Vol. 2. No 4 pp 239-304 With 5 figs. 1 graph & 1 plate [23 refs] English summary

Comparing a strain of malignant tertian malarial parasite of Ethiopian origin with one from the Roman Campagna during maintenance in general paralytics the author has observed that in infections due to the tropical strain fully developed schizonts and young crescents occur commonly in the peripheral blood in cases which cannot be regarded as grave. Other features of the tropical parasites are a paucity of pigment the presence of fair-sized rings in the blood and a marked susceptibility to quinine. Differences were also noted in the crescents, due largely to the appearance of the young crescents in the blood in the case of the tropical strain. It is concluded that *Plasmodium tenue* is not a valid species while the tropical strain should be known as *Plasmodium immaculatum* var *perniciosum* (Ziemann 1915) [See MISSIROLI above.] C M H

ROUBAUD (E) Le comportement anthropophile de l'*Anopheles maculipennis labranchiae* étudié dans les conditions expérimentales en insectarium. [Anthropophilic Behaviour of *A. maculipennis labranchiae* under Experimental Conditions in Insectarium]—*Bull Soc Path Exot* 1939 Mar 8 Vol. 32. No 3 pp 295-297

Observations hitherto unpublished, carried out six years ago on a strain of *A. maculipennis labranchiae* obtained from the south of Spain showed the persistence with which this paucidentate species retains its anthropophilic feeding habits to the third generation bred in captivity. Experiments carried out in small cages 1/20 cubic metre revealed the fact, however that in any given lot bred together certain individuals

LOYD (Mark F) KITCHEN (S F) & MATTHEWS (Chace B)
Consecutive Inoculations with *Plasmodium vivax* and *Plasmodium*
falciparum — *Amer J Trop Med* 1939 Mar Vol. 19 No. 2
pp. 141-150

Four patients inoculated with *P. vivax* were subsequently inoculated with *P. falciparum* and four inoculated with *P. falciparum* were subsequently inoculated with *P. vivax*. In two patients of each group the subsequent inoculation was made during the incubation period of the parasite first injected in one of each during a clinically active attack and in one of each following a recent attack. The results show that current or recent infection with either *P. vivax* or *P. falciparum* in no way interferes with successful infection with the other. Superinfection with the heterologous species during the incubation period gave one positive and one negative result in each group. The negative results could not be attributed to immunity of the test subjects nor are they likely to have been caused by an antagonism between the two species. The observations demonstrate the absence of cross immunity between *vivax* and *falciparum* infections. \ II

SCHLESINGER (Annemarie) Ueber Beeinflussung der Blutzellgranulationen durch Milchinjektion. The Influence of Milk Injection on the Granulations in Blood Cells. — *Folia Haematologica* 1939 Vol. 62 No. 1 pp. 137-139

The report deals with the examination of the blood of 40 patients before and after intramuscular injection of 5-10 cc of milk. This injection method is employed in Albania by the author as a provocative in cases of latent malaria with negative blood examinations. Positive results are obtained in 10-15 per cent of cases so treated.

In a number of cases studied, a few hours or longer after injection, red cells present in the circulation showed characteristic Schüffner's or Maurer's dots. In a few of these cases such stippling was definitely associated with latent *P. vivax* or *P. falciparum* infections respectively as verified by later finding the parasites. Most latent cases, however as diagnosed by symptoms and history showed only stippling in absence of parasites following injection of milk.

Other cases with fever of unknown origin classified as septic or toxic showed normal erythrocytes but had a characteristic granulation in 20-35 per cent of mature neutrophil white cells as a result of injection. The author considers that the parenteral administration of non-specific protein causes the granulations previously present but not detectable to be coarsened and rendered visible. The staining method employed was carefully controlled. J. D. Fulton

LE BURDELLÈS (B) La sérologie du paludisme. Ses techniques actuelles. Ses applications. Ses résultats. [Serology of Malaria. Technique, Application, and Results. — *Rev. Service Santé Milit.* 1939 Feb Vol. 110 No. 2 pp. 267-297 [10 refs]

A clearly written dissertation on malaria flocculation which takes account of most of the recently published work. It contains no new observations.

LE TIES (L J N) Malariabehandeling met het alkaloid hydrochinine [Malaria Treatment with the Alkaloid Hydroquinine]—*Geneesk Tijdschr v Nederl Indië* 1939 May 2 Vol 79 No 18 pp 1090-1101

Hydroquinine a reduced quinine with two hydrogen atoms more than quinine has been neglected in the treatment of malaria although original reports have been uniformly favourable to its use. In the present series of 262 patients suffering from fresh infections and not relapses treatment consisted in a daily 3 portion dose of 0.6 gm. hydrochloride of hydroquinine continued for exactly 7 days. The blood of all the patients was examined daily and was not pronounced negative until it was found to be free of schizonts in thick drop on 3 successive days. Freedom from fever meant that the patient's temperature did not rise above 37°C (98.6 F). Out of a series of 200 benign tertian cases this freedom from fever was attained after the 1st 2nd, 3rd 4th and 5th day by 80 81 35 3 1 patients respectively. 'The influence of the drug on the schizonts was no less satisfactory. Out of 217 patients suffering from tertian malaria 41 74 63 27 6 and 1 were free of schizonts after the 1st 2nd 3rd 4th 5th and 6th days of treatment respectively. Other satisfactory features of the use of hydroquinine instead of quinine were the tolerance of the drug the absence of such complications as deafness tinnitus dizziness nausea vomiting and diarrhoea. It would seem therefore according to the summary that hydroquinine has a prompt effect on the malaria attack an inhibiting action on the production of gametes is capable of diminishing relapses, acts in small doses is readily eliminated possesses little toxicity and is generally superior to quinine.

W F Harvey

HAUER (A) Beispiel einer familiären Form von vererbbarer Chinin-unterempfindlichkeit [Example of a Familial Form of Inherited Quinine Hypersensitivity]—*Arch. f. Schiffs u Trop Hyg* 1939 May Vol. 43 No 5 pp 203-205 With 1 fig

The author had under his care a female aged 51 from Peru suffering from an old duodenal ulcer. She had an intercurrent attack of influenza and she requested that quinine should not be administered as she was highly sensitive to it. She informed him that about half an hour after a dose of quinine severe symptoms developed viz continuous coughing feeling of choking and unbearable itching accompanied by urticaria involving the whole of the skin of the body. The author investigated the family history of the patient and obtained the following information. Apparently the hypersensitivity commenced in the patient's father who lived in Peru and took small doses of quinine in the form of bark. He handed on the abnormality to the patient and her sister the daughter of the former also suffered from hypersensitivity to quinine. The abnormality had thus been passed on through the female members of the family to the third generation. In later generations the author considers that the symptoms of hypersensitivity will increase in severity. He is of opinion that as quinine is very largely used in the treatment of such cosmopolitan diseases as influenza, pneumonia etc. it is important that not only should the patient inform the doctor regarding the hypersensitivity but that there should also be a medical record to accompany the patient.

E D W Greig

- CICCA (M.) BALLIF (L.) CHELARESCO (M.) & LAURINENCO (N.)
Contributions à l'étude du *Pl. falciparum* (Observations sur une souche de parasite qui a subi de nombreux passages) [Observations on a Strain of *P. falciparum* which has undergone Numerous Passages].—*Arch. Roumaines Path. Expér. et Microbiol.* Paris. 1938. Mar. Vol. 11. No. 1. pp. 85-101. With 9 graphs.

During the course of malarial therapy of general paralysis in Rumania 154 passages of a strain of *Plasmodium falciparum* were made on 1,071 patients. The majority of these were by direct blood inoculation but a number were mosquito transmissions. During all these passages no change in the morphology or virulence of the parasite was noted. In a series of tables the data relating to these infections are given—incubation periods, time of appearance of trophozoites and gametocytes, effect of treatment by quinine, atabrin or plasmoquine, the rapidity of development in mosquitoes and so on.

It is shown that in general drugs act more slowly on cases which had been infected by mosquitoes than by blood inoculations. The schizonticidal drugs, quinine and atabrin, whether combined with plasmoquine or not, did not prevent the appearance of gametocytes in a series of 149 out of 269 cases. On the other hand a single dose of plasmoquine (2 cgm.) was just as effective in getting rid of gametocytes in 53 cases as was the administration of large daily doses of this drug during the course of administration of quinine or atabrin during the attack in 110 cases. The results indicate that it is logical to administer a dose of plasmoquine (2 cgm.) three to four days after the completion of a course of schizonticidal drugs (quinine or atabrin) and to repeat this dose at five-day intervals. C. V. NEWSON

- BOCK (Erich). Ueber morphologische Veränderungen menschlicher Malariaparasiten durch Atebrinwirkung. Morphological Changes in the Human Malaria Parasites due to Atebrin.—*Arch. f. Schiffs- u. Trop. Hyg.* 1939. May. Vol. 43. No. 5. pp. 209-214. With 7 figs. [11 refs.]

In a study of the changes undergone by the parasites of human malaria, including *Plasmodium ovale* during atabrin treatment the author has noted, as others have already done, that the first is the clumping followed by extrusion of the pigment. This change may be observed especially after intramuscular injection of the drug within a few hours of the commencement of treatment. Further changes are the solution of the cytoplasm and the shrinking of the chromatin which finally breaks into several separate clumps. As all the parasites react in much the same manner it would seem that the drug is one which acts directly on the parasites. C. V. NEWSON

- KOSTIĆ (Dušan) & ARNČIĆ (Dušan). Zur Malaria Prophylaxe mit Atebrin (Malaria Prophylaxis with Atebrin).—*Arch. f. Schiffs- u. Trop. Hyg.* 1939. July. Vol. 43. No. 7. pp. 306-311. With 1 fig.

The authors carried out prophylactic experiments with atabrin in a region of endemic malaria in Jugoslavia on 240 prisoners and waifs kept under strict surveillance. The observations were made over the whole malaria season, May till October '38, untreated persons acted as controls, and the area of all malarious persons was noted.

A. maculipennis is the chief anopheline of the region but *A. bifurcatus* and *A. superpictus* are also found. The drug was given in 0.4 gram doses per week half of the total being administered on two successive days. Blood examinations were made regularly. During treatment 9 cases were found infected with *P. falciparum* and 5 with *P. vivax*. At the start of the experiment the percentage showing parasites in the blood was 7.5 per cent and at the end fell to 0.8 per cent. in treated cases. Amongst the controls the percentage of infected cases was fairly constant and rose to 46.7 per cent in August. There were no ill-effects from the use of the drug and all treated cases were able to continue at work.

J D Fulton

SINTON (J A) HUTTON (E L) & SHUTE (P G) Some Successful Trials of Proseptasine as a True Causal Prophylactic against Infection with *Plasmodium falciparum*—*Ann Trop Med & Parasit* 1939 Mar 31 Vol 33 No 1 pp 37-44 [19 refs]

The observations described were carried out on eight patients requiring malaria therapy. Proseptasine is a benzyl derivative of alphanilamide para benzylaminobenzenesulphonamide. In order to ascertain whether such malaria prophylactic properties as this drug might possess were really causal that is operative against sporozoites and intermediate forms between sporozoites and trophozoites the administration of the drug was in no case continued later than the day following the application of infected mosquitoes to the patient. A Rumanian strain of *P. falciparum* was employed. From 15 to 20 heavily infected *A. maculipennis* var *atroparvus* applied to each patient assured that each received a larger dose of infection than would commonly be acquired in nature.

Three patients each received 7.5 gm. proseptasine during the 24 hours before the infecting bites and a further 4.5 gm. during the subsequent 8 hours. The discovery of a single parasite in the blood of one of these patients on the 12th day after the bites was the sole evidence of malaria infection in this group. An untreated control patient developed an acute attack of malaria after an incubation period of 11 days.

Two patients received 12 gm. of the drug during the 24 hours before the infecting bites and an additional 15 gm. during the subsequent 32 hours. One of these patients developed fever and parasites 22 days after the infecting bites.

Three patients received 3 gm. of the drug three times at four hourly intervals. One was bitten by infected mosquitoes immediately after the last dose the second 24 hours later the third 48 hours after the last dose. The first and the last of these patients developed acute attacks of malaria after incubation periods of 15 and 16 days respectively.

Thus of the 8 patients 5 showed no clinical or parasitological signs of infection though they had been under close observation from 4 to 5 months. Proseptasine appears to have a true causal prophylactic action against the strain of *P. falciparum* used. In view of the precautions necessary during treatment with sulphonamide compounds and the short duration of the prophylactic action observed, the observations have very limited practical applicability.

N. H.

CLARK (Herbert C.) Review of Recent Research on Drug Prophylaxis and Treatment of Malaria.—*Southern Med J* 1939 July Vol. 32 No 7 pp 685-689 [30 refs.]

MACDONALD (G.) A Design of Flushing Siphon for Control of Anopheline Breeding.—*Jl Malaria Inst of India*. 1939 Mar Vol. 2 No 1 pp 63-69 With 1 text fig & 13 figs. on 4 plates.

Inspired by the work of WILLIAMSON and SCHARFF the author has evolved a siphon for the automatic flushing of streams which has been used with success in Ceylon in the control of *A. culicifacies* breeding. Detailed scale drawings of its construction are reproduced. It is made in three parts, core, case and cover they are each cast in concrete 2 inches thick reinforced with $\frac{1}{2}$ inch steel rods. It is standardized and made in a central depot. It gives an automatic discharge of 475 gallons of water a minute. It can be used singly or in parallel with others. Only a low dam is required for successful operation about 29 inches. It withstands rough treatment and is retailed at a cost of Rs 25 (37s 6d). The heaviest part of the siphon can be carried over rough country by four labourers. It is simple and ingenious and should have a wide field of application. N IV

PEASTON (H.) & REKKER (E. A.) Report on an Examination of the Spleen and Parasite-Rates in School-Children in Freetown, Sierra Leone.—*Ann Trop Med & Parasit* 1939 Mar 31 Vol. 33 No 1 pp 49-62. With 1 map & 4 figs. on 2 plates. [10 refs.]

The results of the examination of 951 children in schools in Freetown, aged from 3 to 10 years, are recorded in this paper. The observations were made in November and December 1935 the most malarious season. The findings are compared with those of previous surveys, notably that of MACDONALD in 1928. Macdonald had found malaria to be hyperendemic in the western half of the town and endemic in the remainder. The spleen rate of the 951 children was 43 per cent. 44.1 for the endemic area and 42.6 for what had been the hyperendemic area. The corresponding parasite rates were 36.3 34.0 and 38.5 per cent respectively. This indicates that the hyperendemic area no longer exists and that malaria is almost equally endemic throughout the city. This improvement is ascribed to the permanent canalization of Sander's Brook and the permanent drainage of the streets draining into that water course. A brief account is given of that work.

The examination of blood films showed a remarkable predominance of *P. malariae*. Of the 345 positive blood films 167 contained *P. malariae* 133 *P. falciparum* 40 both *P. malariae* and *P. falciparum* 4 *P. vivax* and 1 *P. malariae* and *P. vivax*. N IV

EATON (Montee D.) & COGGESHALL (L. T.) Complement Fixation in Human Malaria with an Antigen prepared from the Monkey Parasite *Plasmodium knowlesi*.—*Jl Experim Med* 1939 Mar 1 Vol. 69 No 3, pp. 379-393 With 4 figs. [14 refs.]

The authors have previously reported the development of specific complement fixing antibodies in monkeys infected with *P. knowlesi*.

[see this *Bulletin* 1939 Vol 36 p 404] In this paper observations are described on the sera of normal human beings patients with syphilis patients undergoing malaria therapy with either *P knowlesi*, *P vivax* or *P falciparum* and of patients suffering from naturally acquired malaria. Four *knowlesi* antigens were used prepared either from the blood or from the spleen of monkeys dying from *knowlesi* infections. The parasitized red cells were concentrated frozen dried and preserved in sealed tubes. The spleens were dried in a similar manner.

Antigen 1—Dried red cells were rehydrated 10 cc. of saline being added to the equivalent of 1 cc. of packed cells. The suspension was frozen and thawed 4 times and then centrifuged. The supernatant fluid was the antigen. It was not anticomplementary and was used in tests in a dilution 1 : 4.

Antigen 2—Dried parasitized cells were ground in a ball mill and extracted with saline dilution as in 1. This antigen was slightly anticomplementary and was used in tests in a dilution 1 : 10.

Antigen 3—Prepared from dried spleen by method similar to that used in the preparation of Antigen 2, 1 gm. of dried spleen to 10 cc. of saline. It was definitely anticomplementary and was used in tests in a dilution of 1 : 10.

Antigen 4—Dried spleen was rehydrated 1 gm. dried spleen to 10 cc. saline frozen and thawed as in the preparation of Antigen 1. This antigen was anticomplementary in a dilution of 1 : 2. It was used in tests in a dilution 1 : 12.

Antigen N was prepared from normal monkey red cells with technique similar to that used in the preparation of Antigen 1.

In carrying out the tests the technique used was the same as that used for monkey sera described in a previous paper except that 2 units of complement were used in place of 2½.

The malarial antigens gave negative complement fixation reactions with from 70 to 80 per cent. of luetic and normal sera and weak or doubtful reactions with the remainder. Some human sera gave weak positive complement fixation reactions with antigen prepared from normal monkey red cells the percentage being slightly higher with malarial sera than with normal or luetic sera.

The most specific and sensitive antigen was Antigen 1. It gave strong complement fixation with sera of persons infected with either *P knowlesi*, *P vivax* or *P falciparum*. The reaction is thus group-specific rather than species-specific.

Absorption of malarial human sera with normal monkey red cells does not remove the immune bodies which fix complement with malarial antigens. N IV

MOSNA (Ezio) Contributo allo studio dell'immunità nell'infezione malarica. [Immunity in Malarial Infection.]—*Riv di Parassit* Rome, 1938 Dec. Vol. 2, No. 4 pp. 327-337 [14 refs.] English summary (10 lines)

The author has shown that the serum of monkeys suffering from chronic *Plasmodium knowlesi* infections contains immune bodies of a protective nature. If such serum is injected in large quantities into monkeys at the time of inoculation with this parasite the course of the infection is modified to the extent that it becomes chronic instead of being immediately fatal. The substances are present in the serum in small amount only.

C M Wenyon

RODHAIN (J) with the collaboration of L. VAN HOOFF & G. MUYLLE.
Contribution à l'étude des plasmodium des singes africains. Les
plasmodium des chimpanzés du Congo Belge [Plasmodia of
Chimpanzees of the Belgian Congo]—*Ann Soc Belge de Méd*
Trop 1938 June 30 Vol. 18. No 2. pp. 237-253 With 2 charts.

The author observed in chimpanzees imported to Antwerp from the Belgian Congo malarial parasites of the types which resembled *Plasmodium falciparum* and *P. vivax*. Both these forms the author shows to be easily inoculable to uninfected chimpanzees but not to other monkeys or human beings. Previous failures to inoculate the former of these parasites to man led to the name *P. reichenowi* being given to it. Though in one case MESNIL and ROUBAUD were successful in producing a transitory infection of human *P. vivax* in a chimpanzee the failure to infect man with the chimpanzee *P. vivax*-like parasite rather suggests that it also may be a species distinct from that of man.

C M IV

BRUMPT (E) Les parasites du paludisme des chimpanzés. [The Malaria Parasites of the Chimpanzees.]—*C R Soc Biol* 1939 Vol 130 No 9 pp 837-840

It is well known that the chimpanzee is liable to infection with malarial parasites which resemble the three well-known forms of man. This resemblance is so marked that REICHENOW and others who followed him regarded them as identical. Nevertheless the form with crescentic gametocytes was later given the name *Plasmodium reichenowi*. Recent work by RODHAIN and his co-workers has shown that while two of these chimpanzee parasites are easily inoculable to other chimpanzees they are non-infective to man and fail to infect *Anopheles maculipennis* [this *Bulletin* 1938 Vol 35 p 816]. It would appear therefore that *P. reichenowi* and the *P. vivax*-like forms are different from the corresponding human parasites. It is probable that the *P. malariae*-like form would also be found to be non-inoculable to man. Furthermore the author of the present paper notes that there are actually certain morphological differences between the human and chimpanzee parasites. Accordingly he suggests that the *P. vivax*-like parasite of the chimpanzee be named *P. schweileri* and the *P. malariae*-like form *P. rodhaini*; the *P. falciparum*-like parasite already having been named *P. reichenowi*.

C M IV

ROUBAUD (E.) COLAS-BELCOUR (J) & MATHIS (M) Transmission de *Plasmodium gallinaceum* par *Aedes geniculatus* [Transmission of *P. gallinaceum* by *Aedes geniculatus*]—*Bull Soc Path Exot* 1939 Jan 11 Vol. 32. No. 1 pp 28-30

It has already been shown by BRUMPT that the malarial parasite of fowls *P. gallinaceum* develops completely in two species of *Aedes* viz. *A. aegypti* and *A. albopictus* both of tropical origin. The authors of the present paper show that complete development will occur also in *Aedes geniculatus* a tree-hole breeder of France.

C M IV

HENRY (Ch.) Pouvoir infectant du sang au cours de l'incubation du paludisme de la poule (*P. gallinaceum*) inoculé par moustiques [Infectivity of Blood during Incubation of Fowl Malaria]—*Bull Soc. Path. Exot* 1939 Jan 11 Vol. 32, No 1 pp 30-34

After feeding mosquitoes infected with *P. gallinaceum* on two fowls blood of these fowls was taken daily and injected into others. It was found that not till after the fourth or fifth day was the blood infective. This demonstrates that after mosquito infection there follows a latent period of four or five days before parasites are present in the blood. It is not till two days later that parasites can be detected microscopically. In discussion following the reading of this paper DECOURT states that he has noted a similar latent period following the intraperitoneal inoculation of infected blood. C M W

HEWITT (Redginal) Numerical Relations between Young Red Cells and Parasites throughout the Patent Period in Infections with *Plasmodium cathemerium*—*Amer J Hyg* 1939 Mar Vol 29 No 2, Sect. C, pp 45-59 With 2 figs [21 refs]

Working with *Plasmodium cathemerium* infections in canaries the author has been able to confirm the work of HEGNER and ESKRIDGE (this Bulletin 1939 Vol. 36 p 338) showing that a definite relationship exists between the parasites of different ages and the red cells of different types. This relationship remains fairly constant during the time that parasites are present in the blood. It means that the young malarial parasites enter young red cells only and that both achieve maturity at approximately the same time. At the time of the crises however there appear in the blood red cells which are exceptionally young and when these are attacked by the young parasites the latter attain maturity before the red cells are mature. C M W

GAVRILOV (W) BOBKOFF (G) & LAURENCIN (S) Essai de culture en tissu de *Plasmodium gallinaceum* (Brumpt) [Attempt at Tissue Culture of *Plasmodium gallinaceum*]—*Ann Soc. Belge de Méd. Trop* 1938, Sept 30 Vol 18 No 3 pp 429-434

The malarial parasite of the fowl *Plasmodium gallinaceum* will remain alive and retain its virulence for 21 days in defibrinated blood kept at a temperature of 0-5°C. Under the same conditions parasites in heparinized blood were alive and infective after 10 days but not after three weeks. In spleen tissue culture of adult or embryo fowls the parasites did not survive though they did so for 10 days in cultures of the marrow. It was determined by inoculation of infected blood into the allantoic vessels of the chick embryo at the eighth day of development that the embryo of this age is not susceptible to infection. C M W

HEGNER (Robert) & WOLFSON (Fruma) Tissue-Culture Studies of Parasites in Reticulo-Endothelial Cells in Birds infected with *Plasmodium*.—*Amer J Hyg* 1939 Mar Vol 29 No 2, Sect. C, pp. 83-87

With a view of separating if possible the red cell inhabiting forms of *Plasmodium cathemerium* from the exoerythrocytic schizonts

tissue cultures of the brain lungs and spleen of infected birds were made. After eight days of culture the tissues were inoculated to healthy birds. These became infected with malarial parasites and showed also exoerythrocytic schizonts. It is held that the experiments were inconclusive as even fifteen days after the cultures were made exoerythrocytic schizonts could still be detected in the macrophages though after this interval the cultures did not produce infections.

C M IV

GIOVANTOLA (Arnaldo) *Il Plasmodium gallinaceum* Brumpt i corpi toxoplasma-simili ed alcune inclusioni di probabile natura parassitaria nei globuli bianchi del *Gallus gallus*. [*P. gallinaceum* Toxoplasma-like Bodies and Certain Leucocyte Inclusions in Fowls. — *Rendiconti Istituto di Sanità Pubblica* Rome, 1938. Vol. 1 Pt. 2 pp. 518-531. With 2 graphs & 3 plates (1 coloured) 34 refs.]

Studying *Plasmodium gallinaceum* in fowls the author has found that the cycle of development occupies 36 hours. He has also come to the conclusion that the toxoplasma-like bodies or the "exoerythrocytic schizonts" are actually stages in the development of the malarial parasite and not developmental stages of an independent toxoplasma. Attention is called to two kinds of inclusions probably parasitic in nature which may occur within mononuclear cells in the blood of fowls. The first resemble young stages of the malarial parasite and appear to possess one to four chromatin masses. They are rounded and stain faintly. The second have the form of deeply staining granules, rods, rings or commas and in shape resemble organisms of the *Grahamella* or *Eperythrozoon* type. C M IV

CHORTIS (Panagiotis) Su alcuni studi di sviluppo del *Plasmodium gallinaceum* Brumpt. Nota I. [Development of *P. gallinaceum*.] — *Rendiconti Istituto di Sanità Pubblica* Rome, 1938. Vol. 1 Pt. 2 pp. 532-539.

A study of the development of *Plasmodium gallinaceum* in fowls has led the author to the conclusion that the exoerythrocytic schizonts play no real part in the cycle of the parasite but are accidental and due to the phagocytic properties of the reticulo-endothelial cells, which engulf but do not destroy the young parasites. These develop abnormally and become the exoerythrocytic schizonts. C M IV

CHORTIS (Panagiotis) Sulle alterazioni del sistema reticolo endoteliale nelle infezioni da *Plasmodium gallinaceum*. [Alterations in the Reticulo-Endothelial System in *P. gallinaceum* Infections.] — *Riv. di Parasiti*, Rome, 1938. Dec. Vol. 2. No. 4 pp. 315-322. With 4 text figs. & 3 coloured figs. on 1 plate. English summary (6 lines).

In malaria in fowls due to *P. gallinaceum* acute infections are characterized by a marked proliferation of the reticulo-endothelial system. Such infections may lead to profound fatal anaemia due to destruction of red cells or may become chronic with a lower degree of anaemia. If the acute infection is treated early with quinine the reticulo-endothelial response is less marked, while an anaemia of the

aplastic type is present. Exoerythrocytic schizonts are not to be regarded as normal developmental stages of the parasite. They indicate actually a loss of function of the reticulo-endothelial cells which fail to destroy completely phagocytosed parasites. C M W

RAFFAELE (G) La fase primaria dell'evoluzione monogonica dei parassiti malarici. [Primary Phase of the Monogony Cycle of Malarial Parasites.]—*Riv di Malarologia* Sez. I 1938 Vol. 17 No 5 pp 331-343 With 1 fig [11 refs.] English summary.

Discussing the exoerythrocytic stages of bird malarial parasites the author concludes that these forms are developed either directly from sporozoites or indirectly through the products of division of these forms again infecting cells other than red cells. When the exoerythrocytic schizonts are found in birds which have been inoculated with infected blood it is not the erythrocytic forms which have produced them but the products of a previous exoerythrocytic schizogony which are present in the inoculated blood. This supposes that an exoerythrocytic schizont may give rise to two kinds of merozoites: the one (histotropic merozoites) for continuance of the exoerythrocytic development; the other (haematropic merozoite) for the initiation of the erythrocytic development. It is further supposed that the number of haematropic merozoites produced by exoerythrocytic schizogony increases with each such schizogony, but that at any time the number of exoerythrocytic schizonts to be found is dependent on the number of histotropic merozoites produced at a previous schizogony. In favour of the occurrence of a similar cycle in human malaria the author mentions certain suggestive findings of his own in bone marrow of cases infected by sporozoite inoculation. The fact that atebium fails to destroy the non-pigmented forms while it is active against the red cell forms in birds may have its counterpart in the failure of the drug to act as a prophylactic in human malaria. C M W

UNGO-MUGDAA (Armida) La reazione nucleare di Feulgen negli stadi exo-eritrocitici del *P. gallinaceum* Brumpt (1935) [The Feulgen Reaction in the Exoerythrocytic Stages of *P. gallinaceum*]—*Riv di Parassit.* Rome, 1938, Dec. Vol. 2, No 4 pp 323-328 With 2 coloured figs. English summary, (5 lines)

The author has attempted to stain the various stages of development of *Plasmodium gallinaceum* by Feulgen's method and has found that the exoerythrocytic schizonts alone gave a definite reaction.

C M W

RODHAIN (J) L'infection à *Plasmodium relictum* chez les pingouins. [*P. relictum* Infection in Penguins.]—*Ann. Parasit. Humaine et Comparée* 1939 Mar 1 Vol. 17 No 2, pp 139-157 With 2 plates. [16 refs.]

The author describes an outbreak of malaria in a number of penguins in the Antwerp Zoological Gardens. The parasite which corresponded morphologically to known strains of *Plasmodium relictum* was readily

inoculable to canaries and from them after a number of passages back again to a penguin. A feature of the infection in the penguins was the presence in the brain and organs of large numbers of exoerythrocytic schizonts which did not occur in the canaries. The outbreak was undoubtedly due to mosquito transmission and it might have been supposed that the exoerythrocytic schizonts occurred only after sporozoite injection were it not for their occurrence also in the penguin inoculated from the canary. Of two penguins treated with atabrin one recovered. In the one that died parasites no longer occurred in the red blood corpuscles though exoerythrocytic schizonts were present in the organs. It would seem that these forms are more resistant to the drug than the ordinary blood stages. C M W

DÉMIAN (P A) Contribution à l'immunologie du paludisme aviaire. [Immunology of Bird Malaria].—*Med Parasit & Parasitic Dis.* Moscow 1938. Vol. 7 No 4 [In Russian pp. 550-578. With 1 chart. French summary pp. 578-579.]

Working with 8 species of birds the author has shown that as regards their susceptibility to *Plasmodium relictum* they fell into three groups, the sparrow being the least susceptible though it was more susceptible to one strain of parasite than to others. It was possible by comparing the behaviour of the three groups to different dosages of parasites or methods of inoculation to arrive at certain results having a bearing on questions of immunity and premunition. C M W

MOSEKOVSKI (Sh D) & SYRKEVE (S A) On Morphological Alterations in Blood Elements under the Influence of Antimalarial Chemotherapeutic Preparations and Related Compounds.—*Med Parasit & Parasitic Dis.* Moscow 1938. Vol. 7 No 3 [In Russian pp. 386-398. With 11 figs. English summary p. 368.]

Testing a number of compounds for antimalarial properties it was found that a number of the acryline series caused the appearance in the polychromatic erythrocytes of mice and birds of certain blue-staining (Giemsa and Pappenheim) granules. These stain intensely with brilliant cresyl blue in supravital staining. It is significant that it is just those compounds which are active against bird malarial parasites which cause the appearance of these small granules up to 3 microns in diameter in the red cells. C M W

DURAND (Paul) & VILLAIN Dérivés sulfamidés et paludisme du pigeon [Sulphanilamide Derivatives and Pigeon Malaria].—*Arch Inst Pasteur de Tunis* 1939. Mar. Vol. 28. No 1 pp. 94-95.

The authors have treated a number of pigeons harbouring *Haemoproteus columbae* with the sulphanilamide derivatives rubiazol and septoplax. The drugs were administered intramuscularly but in the doses given failed to influence the infections. C M W

MISCELLANEOUS

NICOLLE (P) & SIMONS (H) Quels services peut on attendre en pathologie exotique de la mesure de la vitesse de sédimentation des hématies? [The Erythrocyte Sedimentation Reaction in Tropical Medicine].—*Bull Soc Path Exot* 1939 Feb 8. Vol. 32. No 2. pp 223-233 [Bibliography]

This reaction is largely used in differential diagnosis and as a measure of prognosis in numerous diseases in Europe. The authors here set out the general findings in tropical conditions. In amoebiasis the sedimentation rate is accelerated in three-quarters of the cases and is especially related to hepatitis. In kala azar acceleration is constant it decreases with treatment though there may be as is not uncommon in chemotherapy a period of exaggeration of acceleration before the return to normal. In malaria acceleration is general though there may be retardation during an acute attack. In relapsing fever the more numerous the relapses the more rapid the sedimentation. There is acceleration in Weil's disease which serves to differentiate it from catarrhal jaundice in which sedimentation is normal. In one case of rat bite fever the reaction was accelerated and in yaws (as in syphilis) it is rapid in the secondary and tertiary stages. In undulant fever as in typhoid the acceleration at first is only slight and this may be a useful point in diagnosis at a stage when serum and skin reactions are not yet positive. Sedimentation is more rapid in the nodular than in the neural forms of leprosy and the author refers to the reaction of Rubino [see this *Bulletin* 1939 Vol 36 p 691].

In trachoma there is acceleration especially in the second stage of the disease and in lymphogranuloma inguinale acceleration is seen more markedly in the genito-rectal than in the glandular form. If pronounced in the latter it should lead to the suspicion of extension of the disease. In yellow fever sedimentation is delayed.

There are conflicting reports in ankylostomiasis but in tapeworm infection sedimentation is slow. In scurvy the reaction is marked. [Since the acceleration in the sedimentation rate is seen in so many diseases its value in diagnosis which has been claimed is more than doubtful.] C W

MYERS (Victor C.) & EDDY (Helen M) The Hemoglobin Content of Human Blood.—*Jl Lab & Clin. Med* 1939 Feb Vol 24 No 5 pp. 502-511 [41 refs.]

The haemoglobin content of finger capillary blood from 111 healthy adult males and 48 healthy adult females in Cleveland was determined by three methods. Firstly Newcomer's acid haematin method was used the apparatus being calibrated against the oxygen capacity method of van Slyke. Secondly the haemoglobin was calculated from the iron content of the blood. For these determinations the samples were digested with sulphuric acid oxidized with hydrogen peroxide and the colour developed on adding a drop of thioglycolic acid and rendering the solution strongly alkaline with ammonium hydroxide compared colorimetrically with that developed in a standard iron solution similarly treated the error from non-haemoglobin iron was neglected and the iron determined was assumed to be 0.335 per cent. of the haemoglobin. The third set of determinations was made by

adding diluted laked blood to a benzidine reagent, followed by hydrogen peroxide and acetic acid, the purple colour developed being compared colorimetrically with that obtained from a standard solution of blood similarly treated [cf this Bulletin 1938, Vol. 35 p 449]. Agreement between the methods was good and the average haemoglobin values were for males 15.8 gm. and for females 13.0 gm. per 100 cc. blood.

Tables are given summarizing values obtained in some 3000 observations by various authors and the conclusion is expressed that normal adults in good nutrition, not residing at excessive altitudes above sea level show essentially the same concentration of haemoglobin in the blood, without difference due to race or geographic location. The only difference is that due to sex, which has long been recognised. In advanced age the values fall slightly whereas at birth the level is very high being 20 to 22 gm. per 100 cc. Following birth it sinks rapidly reaching 10 gm. between the second and third month after which it rises to 12 gm. between the fifth and six months, where it remains during childhood. The authors figure for males agrees with the mean of the other observers given in the tables but the value for females of 13.0 gm. per 100 cc. is definitely lower than the mean of 13.8 gm. obtained from the tables the reason for this difference is not clear.

F. Murgatroyd

SCHALM (L.) Ein kleiner Apparat zur Messung des mittleren Durchmesser der roten Blutzellen. [A Small Instrument for the Measurement of the Mean Diameter of the Red Blood Cells].—*Klin. Woch.* 1939, Apr. 1, Vol. 18, No. 13, pp. 470-471. With 2 figs. [10 refs.]

This small halometer designed by the author and Dr. SCHOUTEN and marketed by ZEISS consists of a tube about 2 cm. wide and 6 cm. long. At the eye end is a half-lens which focuses a scale occupying the corresponding half of the opposite end of the tube. Adjacent to the lens is a slot to carry the blood film so that it covers the half of the field unoccupied by the lens. When any convenient but small source of light at least 3 to 4 metres away is observed through the blood film the eye accommodates so that at the same time the scale is sharply defined through the lens. The observer then sees, in the upper half of the field, half the annular diffraction spectrum produced by the blood film. In the lower half of the field he sees the scale which indicates half of a spectrum, corresponding in size to that of a normal blood. The half-rings in the upper and lower fields are adjusted concentrically by aligning the source of light on the centre mark of the scale, and, as the two half-fields are separated only by a line it is possible to judge whether the spectral rings produced by the blood are equal, smaller or larger in diameter than the corresponding rings of the scale representing those of a normal blood, and therefore whether the blood film under examination represents a normal, macrocytic or microcytic blood. On the right side of the scale are a number of vertical lines in relation to which the large yellow ring of the blood spectrum may be observed. Reading from right to left each division represents an increase of 0.5 μ over the mean cell diameter of normal blood. The instrument is designed merely for quick and rough estimations at the bedside and more accurate apparatus is recommended for precise work.

F. Murgatroyd

GREVAL (S D S) CHANDRA (S N) & WOODHEAD (L S F) On M and N in Blood Groups the Technique of Typing the Antifluids, Findings in 300 Indians, and Associated Considerations—*Indian J Med Res* 1939 Apr Vol 26 No 4 pp 1041-1054 With 1 plate

The technique for grouping and typing blood is described in which the suspensions of cells are mixed with the sera on a slide in a moist chamber and the results read macroscopically in 5 to 15 minutes. Type sera were obtained from rabbits injected respectively with OM and ON cells from donors previously typed by means of commercial anti M and anti N fluids. The anti-OM and anti-ON rabbit sera were then absorbed respectively with ON and OM cells so as to obtain residual anti-M and anti-N fluids. Some degree of non-specific absorption of anti-N substance by OM cells occurs but anti M substance does not appear to be absorbed by ON cells. The quality of fluids obtained in different experiments varied but fluids of good potency and specificity were used to test 300 Indians in Calcutta hospitals and the following results were obtained M 42.7 per cent. N 10.7 per cent. and MN 46.7 per cent. A small series of Europeans was typed and a table is given showing the results together with the comparative findings of other workers elsewhere. The forensic application of typing is pointed out. Factors M and N are both dominant and the genotypes of the phenotypes M MN and N are MM MN and NN so that (1) the agglutinogens M and N cannot appear in the blood of a child unless present in the blood of one or both parents and (2) a type M parent cannot have a type N child and a type N parent cannot have a type M child. Quite unrelated to these types are the iso-haemagglutinogens A and B so that there are three types in each blood group thus making possible 12 descriptions of blood, if only the original four groups are considered or 18 descriptions if sub-groups A_1 and A_2 are considered. It is also suggested that typing as well as grouping may be important in transfusion work.

F Murgatroyd

NAPIER (L. Everard) The Aetiology of Tropical Macrocytic Anaemia. —*Indian Med Gaz* 1939 Jan. Vol. 74 No 1 pp 1-8 With 6 charts. [21 refs]

Reviewing recent work the author points out that tropical macrocytic anaemia which may not represent a homogeneous group of diseases differs in a number of respects from pernicious anaemia. Apart from slight numbness and tingling of the toes and feet and diminished knee jerks neurological signs are universally absent in tropical macrocytic anaemia even of extreme severity while sore tongue and glossitis are also less common than in pernicious anaemia. The mean erythrocyte volume is high in both diseases but in the tropical anaemia the mean cell diameter is only slightly above normal suggesting spherocytosis and anisocytosis and poikilocytosis are less than in pernicious anaemia. The common slight initial reticulocytosis of pernicious anaemia is absent in uncomplicated tropical macrocytic anaemia and in the latter disease the author has not seen haemoglobinized megaloblasts in the peripheral blood and only rarely in the marrow. There is a lesser tendency to leucopenia and to shift to the right in the Arnetz count in tropical macrocytic anaemia than in pernicious anaemia. In the uncomplicated tropical anaemia there is said to be no increased bilirubinaemia and achlorhydria is not constant.

in this disease Yeast extract or marmite alone will produce a haemopoietic response and cure in tropical macrocytic anaemia whereas anahaemin so potent in pernicious anaemia sometimes fails even in massive doses the insoluble ammonium sulphate fraction of campolon, active in pernicious anaemia, is inactive in tropical macrocytic anaemia but the soluble fraction is active in both diseases as is campolon and other crude liver extracts. The author believes that in tropical macrocytic anaemia there is general hyperplasia of the red cell forming elements with excessive multiplication but delayed maturation at the megaloblast level or in other words interference with the normal development of the red cell occurs at a later stage than in pernicious anaemia. Such red cells being relatively more normal than those of pernicious anaemia are less susceptible to destruction by a normal reticulo-endothelial system and so in the uncomplicated tropical anaemia there is no excess bilirubinaemia. Where there is excessive haemolysis in tropical macrocytic anaemia the author agrees that reticulo-endothelial hypertrophy due to antecedent chronic malaria is the probable predisposing factor.

F Mergatroyd

EVANS (Barbara D F) & WILLS (Lucy) Red Cell Fragility in Tropical Macrocytic Anaemia.—*Jl Path & Bact* 1939 Mar Vol 48. No 2 pp 437-442 With 2 charts

The authors give the following summary —

(1) The uncorrected median corpuscular fragility in 40 cases of tropical macrocytic anaemia lay between 0.255 and 0.375 per cent NaCl, with a mean of 0.316 per cent. The normal mean of 0.306 per cent., determined by the same method, is significantly higher.

(2) The difference could be largely eliminated by applying a correction for anaemia the range in 39 of the above cases then becomes from 0.302 to 0.423 per cent NaCl, mean 0.356 per cent. The normal mean is only probably significantly higher than this corrected figure. The exclusion of all pregnant or recently delivered patients from the anaemia series made the difference between the mean M.C.F. of this series and that of the normal 0.0174 per cent NaCl, standard error 0.0063, a significant difference.

(3) The M.C.F. for mean and non-pregnant women was significantly lower than the M.C.F. of pregnant women but the number of pregnant women tested was small.

(4) It is suggested that pregnancy may result in an increased fragility masking the decrease which takes place in uncomplicated tropical macrocytic anaemia.

(5) Using the corrected figures for M.C.F. there was no correlation between the degree of anaemia and the value of this figure.

DIGGS (L W) & BRIB (Juanita) The Erythrocyte in Sickle Cell Anemia. Morphology, Size, Hemoglobin Content, Fragility and Sedimentation Rate.—*Jl Amer Med Assoc* 1939 Feb 25 Vol 112 No 8 pp 685-700 With 8 figs [16 refs.]

In sealed fresh preparations most of the cells are round or oval, although there may be a variable number of irregular elongated or pointed cells, but as the preparation stands and carbon dioxide increases cells expand and undergo transformation to bizarre multi-pointed forms. This may begin within an hour and is usually completed within twelve or twenty-four hours, the rate being increased if the blood is anovaemic. The commonest change is a rapid thickening

of the cell on one side with thinning of the disc on the opposite side the cell diameter becomes increased and the thinned out portion pointed while coincidentally the thickened portion becomes elongated and pointed filaments extrude from its ends and side condensation of the haemoglobin sometimes into several foci may occur. These preliminary changes occur within a few minutes and subsequent changes are slow. In other cells active kneading movements precede the formation of spicules while in others no visible movement occurs until the development of barbs of cytoplasm. If the preparation is exposed to air bizarre cells revert to round form if left sealed for some days all the cells become haemolysed or rounded up and finally disintegrated. The more mature cells sickle more readily than the less mature.

The most characteristic sickle cell is hyperchromatic elongated pointed at each end and curved in the middle and may be 50μ long and only 1 to 2μ broad the average size being from 10 to 20μ long and from 2 to 4μ broad. The number of typically sickled forms is highly variable in different patients and is not related to the severity of the anaemia. The size of the round erythrocytes in sickle cell anaemia is also highly variable ranging from as small as platelets to as large as neutrophils the average diameter being greater than normal. Reticulocytosis is common the average of forty two cases being 15 per cent. Fixed tissue preparations show sickled cells especially in the spleen and bone marrow and the distension of small capillaries by these cells may be a factor in the production of thrombosis which is a common feature of this disease. The average mean corpuscular volume of forty four cases was 90μ , the average mean corpuscular haemoglobin 29 $\gamma\gamma$ and the average mean corpuscular haemoglobin concentration 32 per cent. from which it was concluded that the erythrocytes in sickle cell anaemia are usually of the normocytic, normochromic type with a tendency toward macrocytosis. The erythrocytes are more resistant than are normal cells to hypotonic saline but less resistant to carbon dioxide and mechanical trauma. The sedimentation rate was variable.

Dr E. E. Osgood raised the question of differentiating true sickle cell anaemia from other anaemias in a negro with the sickle cell trait. He also stated that ovalocytosis or familial poikilocytosis occurs as commonly in white persons as in negroes has no association except accidentally with anaemia and can be distinguished from true sickle cell anaemia by the fact that the cells are really sausage shaped with rounded ends and the number of poikilocytes does not increase in an atmosphere of carbon dioxide or on standing in moist cover slip preparation. Dr L. W. Diggs stated that in true sickle cell anaemia typical oat and crescent forms can usually be found and are rarely observed in other blood dyscrasias. There is also leucocytosis thrombocytosis and evidence of abnormal regeneration of bone marrow. The reticulocytes are increased. The erythrocytes are more resistant to hypotonic saline. There is a history of chronic anaemia recurrent febrile illnesses with severe pains and important physical signs are jaundice cardiac enlargement hepatomegaly and ulcers of the legs. In the early stages the spleen is enlarged but later atrophied. Patchy osteoporotic and osteosclerotic changes occur in the long bones. Usually sickle cell anaemia is not confused with other anaemias but with some acute febrile illness. In addition to ovalocytosis where the cells do not undergo further change in moist preparations there is a

third type of abnormality characterized by elliptical cells which in moist preparations protrude points from their ends and become oat shaped. This resembles the sickle cell trait but should not be confused with it.

F Murgatroyd

PLAUT (Alfred B. J.) *Aplastic Anaemia. A Case Report.—South African Med J* 1939 May 13 Vol. 13 No 9 pp 324-327
With 1 chart.

A case of much interest, because such are rare but seem to be becoming less so not only in the tropics but in temperate climates also. The subject in this instance was a European 23 years of age, admitted to hospital for epistaxis. Soon after there were haemorrhages from nose throat gums ears melaena, and later haematemesis bleeding of the fundi and purpuric spots on legs and abdomen. Transfusion and haemostatics were practically ineffectual and death occurred 22 days after admission to hospital.

Agranulocytosis was a feature but the absence of anginous sore throat and of mucosal or other ulceration was against this as the basal diagnosis, as was the more marked degree of anaemia. The colour index in the early stage was above unity but fell gradually to 0.87. One particularly notable feature was the rapid reduction in platelets. A week after the patient's admission to hospital they numbered 213 000 per cmm but in less than a fortnight later were too few to estimate.

This case is referred to here because of the resemblance to onyala [see this *Bulletin* 1938 Vol. 35 pp 74 444 and 1939 Vol. 36 pp 157-160] though the characteristic blood blisters in the mouth were not seen. Treatment by intramuscular injection of whole blood has had excellent results in onyala, but was not tried in this case.

H H S

MOESCHL (Hermann) *Seltene Formen von hyperchromen Anämien. [Rare Forms of Hyperchromic Anaemia].—Wien Klin. Woch* 1939 Apr 21 Vol. 52 No 16 pp. 373-378. With 1 fig [13 refs.]

Several instances are here recorded in which the signs of hypochromic anaemia were a marked feature. Some were cases of pernicious anaemia, others were associated with ulcer of the stomach, with malignant disease and so forth but one was of interest from the view of the tropical practitioner. This was a man of 57 years who had served in India and had suffered from malaria and at one time from abdominal pain due to appendicitis and appendectomy had been performed. Symptoms typical of sprue now declared themselves and red cells numbered 1,330 000 per cmm Hb 35 per cent. C.I. 1.3 anisocytosis poikilocytosis, polychromasia, macrocytes and a few normoblasts were present. An unusual finding was gastric hyperacidity with the anaemia [but see this *Bulletin* 1923 Vol. 20 p 733 and 1924 Vol. 21 p 43]. Improvement followed the administration of liver and vitamins B and C.

H H S

TROWELL (H. C.) *Diagnosis and Treatment of the Common Anaemias of Uganda.—East African Med J* 1939 Mar Vol. 15 No 12 pp 402-418. [34 refs.]

Anaemia is probably so common in East Africa that few natives have a normal haemoglobin. Confusion may arise in the classification

of these anaemias because the average red cell of the East African native may be larger than that of the European and more work must be done on their normal and abnormal Price Jones curves. All observers are agreed however that the common anaemia is hypochromic. The most frequent cause appears to be hookworm infestation due exclusively to *N. americanus*. Hookworms produce anaemia by intestinal haemorrhage and if the anaemia is severe the occult blood test is always strongly positive even to several dilutions of the faecal suspension. The author believes that anaemia due to malaria is only common in persons with poor immunity, namely babies and adult immigrants; it should not be diagnosed in the absence of parasites whereas in hookworm anaemia there is iron loss. Many anaemias are however due to the operation of several different factors hookworms, malaria and dietary deficiency, none of which can at present be quantitatively assessed. For the hypochromic anaemias 20 grains of ferrous sulphate thrice daily is satisfactory. This salt is relatively stable in solution but a few minims of sulphuric acid are added to dissolve the small amount of ferric hydroxide produced and so preserve the appearance of the solution. [For a discussion of the cause of hookworm anaemia see this *Bulletin* 1937 Vol 34 pp 1-14] *F Murgatroyd*

MACDONALD (G) A Study of Anaemia affecting Labourers on Assam Tea-Estates.—*Indian J. Med Res* 1939 Apr Vol. 26 No 4 PP 1001-1040 [21 refs]

The author examined 9 042 persons on tea estates in Assam and found 10.42 per cent. of women 5.33 per cent of children and 2.77 per cent. of men with an average haemoglobin of less than 50 per cent as determined by Tallqvist's scale. He regards anaemia as the chief cause of the possible exception of malaria of sickness and death among the labourers and estimates that 3 000 working days and 6 lives per 1 000 persons *per annum* are lost because of it.

Contrary to common belief hookworm infection, although it may aggravate the severity or make cure more difficult does not appear to be the chief cause of the anaemia because the degree of infestation showed a lack of correlation with the severity of the anaemia and because the effects of antihelminthic treatment on the anaemia were variable [but see this *Bulletin* 1933 Vol. 35 p 278 and 1939 Vol. 36 p 324] Other possible causes were explored in an epidemiological study.

The staple diet is rice with the addition of dhal a pulse resembling the lentil, and small quantities of mustard seed oil some green vegetable and some form of animal protein are obtained by most people on one or more days of the week. Fat is deficient. The calcium intake is low and the P/Ca ratio high but the addition of calcium showed no therapeutic advantage the iron intake is above the normal standards. Carotene and vitamin A are very deficient and this explains the high incidence of phrynoderma xerophthalmia and night blindness other vitamins seem adequate. The rice is either home-pounded, retaining considerable quantity of pericarp and most of the germ or it is milled and before either of these processes it may or may not be parboiled. An experiment showed the mean haemoglobin value of women consuming one of the four possible varieties to be as follows home-pounded parboiled, 75.63 per cent. home-pounded

raw 71.72 per cent. milled raw 70.77 per cent. milled parboiled, 61.10 per cent. The difference between the home pounded parboiled and milled parboiled series is very highly significant that between the home-pounded parboiled and milled raw series is also significant. It was considered, however that the varying haemogenic properties of the rice were a subsidiary, and not the predominant cause of the prevailing anaemia.

The labour force consists of those settled on the estates and of short-term recruits. The former live at a reasonably good economic level whereas the latter despite good earnings, tend to live often because burdened by debts in their own countries on a pittance which may involve serious malnutrition but contrary to normally accepted belief the incidence of anaemia was approximately equal in the two groups. It was found however that anaemia was significantly more frequent among both groups on estates where there was a high proportion of newly recruited labour and this suggested the possibility of an infective cause for the anaemia. Although the spleen rate showed no correlation with the incidence of anaemia it was considered that malaria might be an operative factor through the admixture of different strains of parasites or some upset in the balance between transmission and immunity following the mixture of new recruits and settlers having varying degrees of immunity.

Two experiments were designed to test this hypothesis. In the first 42 anaemic women were treated with atabrin and small doses of iron, and they showed a highly significant increase in their haemoglobin compared with controls receiving only iron. In the second experiment a search was made for malarial parasites in placental films, since only a small percentage showed parasites in the peripheral blood but no significant correlation between anaemia and the presence of parasites was revealed.

Unfortunately the work was prematurely terminated but the results are highly suggestive and, should the connection between the anaemia and malaria be substantiated, reaffirm the importance of malaria control. In any case it seems desirable so far as possible to keep the old settled inhabitants and the new and temporary labourers segregated.

F Murgatroyd

GIGLIOLI (George) *Health Conditions on Sugar Estates.—Health Conditions on the British Guiana Sugar Estates 1938* Nov 21 Annexure 5 pp v-xxx With 8 diagrams & 2 plans.

To the Annual Report of the Surgeon-General, British Guiana for 1934 Dr Giglioli contributed an admirable survey entitled *Medical Reorganisation and Work on the Sugar Estates* of Blairmont, Bath and Providence [see this *Bulletin Supplement* 1936 p 228] in which he demonstrated that effective and economic preventive measures in the interests of public health can only be framed on the basis of data systematically collected over an adequate period of time. In the present paper Dr Giglioli continues these excellent studies but this time his observations are extended to cover all sugar estates in British Guiana.

Following brief references to climatic and topographical conditions and the relevant vital statistical facts characterizing the estate populations under review Dr Giglioli proceeds to the detailed discussion of the several features of sanitary organization and administration,

prevalent diseases causes of deaths etc. These descriptions are deserving of the most careful consideration for on the present occasion it is possible to do no more than to refer briefly to one or two sections of the Report under review

The 21 estate hospitals in British Guiana have bed accommodation for 1,246 patients each hospital being in charge of a *Sick-Nurse Dispenser*. It is pointed out that while Dispensers are unusually well qualified to carry out what should be their work *e.g.* dispensing—their clinical training is negligible yet on sugar estates and in rural districts in general the work of the dispenser is mainly clinical. He is expected to diagnose and treat cases decide which patients are to be admitted to hospital and which are to be seen by the Government Medical Officer but the great majority of patients the dispenser treats himself as Casual cases. In these circumstances Dr Giglioli observes that the accuracy of diagnoses must be treated with the greatest reserve and is of the opinion that from the medico-statistical point of view estate hospital records are of questionable value. *Malaria* which is the dominant health problem and directly or indirectly influences all other sanitary matters is reviewed at length in this *Bulletin*, 1939 Vol. 36 p 805 but it is pertinent to observe that during 1937 admissions to estate hospitals totalled 15,225 patients treated by G.M.O.s numbered 3 135 only while casual cases treated by Dispensers numbered 183,398. Among the cases treated were 42,311 of *malaria* and of these no less than 33 151 or about 79 per cent were treated as casual cases by Dispensers.

The notes on the *prevailing diseases* are based on experience for the six years ending 1937, and are presented at some length. It is noted that over the period *malaria* claimed an average of 157 deaths per annum and that *chronic nephritis* was also a serious cause of disability and death with an average of 102 deaths per annum. *Respiratory diseases* are prevalent but the low incidence of *tuberculosis* is noteworthy with an average of only 16 deaths per annum. *Nutritional diseases* are common amongst East Indians and *enteric fever* probably more widespread than available records would indicate.

Housing water supplies sewage disposal etc. are other important matters discussed by Dr Giglioli and for information on these matters the reader is referred to the Report itself P Granville Edge

ORENSTEIN (A. J.) *Tropical Sanitation in its Application to Organised Industry in South Africa.*—*Public Health* Johannesburg 1937 Dec. pp. 13, 15 17-21 23

BUTTLE (G. A. H.) *The Action of Sulphanilamide and its Derivatives with Special Reference to Tropical Diseases.*—*Trans Roy Soc Trop Med & Hyg* 1939 July 28. Vol. 33 No 2 pp 141-159 With 5 figs. [93 refs.] Discussion pp 160-168 [SINTON (J. A.) MAXSON BARR (P.) SHARP (N. A. Dyce) LEWTHWAITE (R.) FAIRLEY (N. Hamilton) FELIX (A.) & BUTTLE (in reply)]

Since the introduction of prontosil by Domagk in 1935 there have been few branches of medicine in which sulphonamide drugs have not been employed. The sulphonamide compounds so far employed in the chemotherapy of bacterial infections can be classified into two groups. From sulphanilamide itself are derived (a) compounds containing substituents in the amino group prontosil, rubiazol

proseptasme soluseptasine and prontosil soluble, (b) compounds containing substituents in the amide group uliron albucid and M. and B 663 Sulphone derivatives unrelated to sulphanilamide are rodfone and 4-4-diaminodiphenylsulphone the latter while more effective than sulphanilamide is unfortunately more toxic. The sulphonamide group of drugs has been employed in a number of tropical infections. There is no evidence that helminthic diseases are directly affected, but in filariasis improvement is due to curative action on the secondary streptococcal invaders. *Plasmodium knowlesi* in monkeys is susceptible to sulphonamide drugs but human malarial parasites are resistant except the asexuals of *P. falciparum*. Trypanosomes are unaffected but a number of bacterial diseases appear to be favourably influenced by sulphonamides more especially plague meningococcal and pneumococcal infections. Clinical results obtained in the treatment of typhoid and Brucella infections are less satisfactory while the only virus diseases which are in any way affected are small-pox, lymphogranuloma inguinale and trachoma, the corneal improvement in the last condition being more marked than that of the conjunctiva. The mode of action of the sulphonamide drugs is still uncertain. In the subsequent discussion, Dr N. A. Dyce Sharp reported that he had cured five consecutive cases of tetanus with prontosil, proseptasme or sulphanilamide given either by mouth or by intramuscular injection. Dr Lewthwaite reported failure to influence tsutsugamushi disease in guinea-pigs but thought sulphonamide drugs might be of value in treating the bronchitis and bronchopneumonia, which are common complications of human infections. Dr Felix stated that in the treatment of typhoid fever the sulphonamides had been disappointing. No good results had been obtained from the use of the drugs in combination with antityphoid serum.

G. M. Findlay

- i. DIXONO (J. E.) Treatment of *Brucella melitensis* Infection with Prontosil.—*Brit Med J* 1939 Feb 18, pp. 326-327
- ii. BRITISH MEDICAL JOURNAL 1939 Feb 18, p. 342.—Chemotherapy in Undulant Fever

i. In view of the favourable reports published on the effect of sulphonamides in undulant fever [see also this *Bulletin* 1939 Vol. 35 p. 826 and 1939 Vol. 36 p. 157] the author attempted this treatment in 25 patients in Malta. In all cases the diagnosis was confirmed by agglutination reactions of over 1 in 100 and as *Brucella abortus* has not been found in Malta, all the infections may be regarded as due to *Br. melitensis*. In 12 blood culture was positive. Sixteen cases were of the ordinary type 4 of the malignant and 6 of the mild intermittent type. In 18 prontosil rubrum was used, in 4 prontosil album and in 3 streptococci. The average dose was 4.5 gm daily for 7 days but this was prolonged to 12 days in 4 instances and stopped early on account of intolerance in 5.

In 19 cases there was no apparent effect on the temperature or on the course of the disease in the other 6 (apparently successful) cases two relapsed (one died) one was a very mild case in one a very small dose was given and two recovered in the 8th and 17th week respectively. In 5 instances blood culture was attempted on the 7th day of treatment and in 4 of these it was positive in the fifth the culture was contaminated.

The author is therefore definitely of the opinion that these drugs are not useful in undulant fever in Malta and in view of the usually low mortality of the disease and the definite element of danger in sulphonamide therapy considers that its use is not justified.

ii. The Editorial points out that *Br abortus* may be more susceptible to chemotherapeutic attack than *Br melitensis* and that it would be unwise to compare too closely these findings based so largely on treatment with prontosil rubrum with others in which sulphanilamide was used since it is generally accepted that the latter has superseded the former. A plea is made for a further trial with sulphanilamide in a standardized system of dosage used in alternate cases. C IV

BYNUM (W Turner) Recurrences of Undulant Fever (Brucellosis) following the Administration of Sulfanilamide.—*Jl Amer Med Assoc* 1939 Mar 4 Vol 112 No 9 pp 835-836

Six cases are reported, two with acute one with subacute and three with chronic brucellosis. The diagnosis was confirmed either by agglutination or skin tests. Sulphanilamide was given in adequate doses but although improvement followed in three of the cases later relapses occurred. Two of the patients experienced no relief of symptoms and one seen first two weeks after finishing a heavy course of sulphanilamide for gonorrhoea was not given a further course. The author has not therefore been able to duplicate the satisfactory results reported by other workers. [See also this *Bulletin* 1938 Vol. 35 p 826 1939 Vol. 36 p 157 and DEBONO above] C IV

CONDELL (Lyle A.) Sulfanilamide in Treatment of Brucellosis.—*South Western Med* 1939 June Vol 23 No 6 pp 173-176

CLEMENTE (Giuseppe) Sulla vaccinoterapia delle Brucellosi con vaccino antimehitense Bruschettini [Treatment of Human Cases of Brucellosis with Bruschettini Vaccine].—*Riv Sanitaria Siciliana* 1938. Dec. 15 Vol. 26 No 24 pp 1436 1439-42 1445

The author speaks of 40 cases and gives notes of seven infected with *Br melitensis* in which other forms of treatment and other vaccines had been tried ineffectually but in which much benefit followed the use of a vaccine obtained from Bruschetti Laboratory of Genoa. In some it was administered intramuscularly the contents of a phial every 48 hours [but the actual dosage is not stated] in others intravenously. In all it was well tolerated, but the febrile response was more marked following *intra venam* injection. H H S

HOODLESS (D W.) Medical Education of Native Races.—*Fiji Ann Med & Health Rep for Year 1937* pp 30-32.

McGUSTY (V W T) Note on the Central Medical School in Suva in Relation to the Health Problems of the Pacific.—*Ibid* pp 33-35

HOODLESS (D W.) Report on the Central Medical School, Suva.—*Ibid* pp 36-40

Hoodless discusses the education of Fijians in general and remarks that a healthy youth if taken early enough and given equal facilities

can be educated to the same extent as a European youth. He gives a brief account of the history of medical education in Fiji. McGusty states that from its inception to the end of 1936 195 native medical practitioners have graduated from the Central Medical School. Emphasis is laid on the aim of the School to encourage the students to retain their native habits of living as far as possible. The course lays stress on operative surgery public health and preventive medicine. The formation of this school was only rendered possible by the pooling of the resources of the participating administrations.

Hoodless shows that in 1937 the average total cost per student was £74. In 1931 the course of study was extended from three to four years. Hospital duty is performed and lectures are given by members of the honorary staff. During the year 47 students and post-graduate students were in residence and the average number of Fijian students who qualify each year is four with an average annual loss of two. In Fiji there is one Native Medical Practitioner for every 1 600 of the native population. The first certificate was issued in 1888. [See, for fuller account this *Bulletin* 1936 Vol. 33 p. 828] C IV

DE LANGEN (C D) Medical Training in the Indies.—*Bull Colonial Indl Amsterdam* 1938 Feb. Vol 1 No 2 pp 125-134

Medical instruction was first given to natives in the Netherlands Indies at Batavia in 1851 with a view to training them as vaccinators. The course was gradually extended as it was realized that these persons would be expected to do more than vaccinate until now the medical school at Batavia attains full European standards and there is another school at Surabaya. The full course at Surabaya lasts 8 years and the graduates are fully qualified to practise in the Netherlands Indies, but not in Holland. It is intended to bring the standard at this school up to that of Batavia.

In addition to these fully qualified native doctors the authorities train subordinate assistants to act as nurses orderlies, laboratory assistants and the like. Since these persons are not regarded as fully qualified it is unlikely that they will bring discredit on western medicine by undertaking and failing to perform efficiently tasks beyond their capacity which might happen if a dual standard of qualification were permitted.

The author shows that modern hygiene has points in common with native custom but that western therapeutic measures are strange to the native mind, and urges that the traditional native methods of treatment, often based on experience handed down in families, should not too readily be dismissed by those with western education. He gives a warning against the use by students of advertisement literature in place of standard text-books. This practice is encouraged by the increasing amount of general pathology included in the pamphlets circulated free of charge to medical students by big business firms whose primary object is not the spread of accurate information.

The training of Asiatic medical men should be consciously directed in a manner that will fit them for their special task. The conditions differ in many respects from those which western medical men meet in Europe. [The same reasoning applies to the training of European medical men who intend to work among native races.] C IV

MARTIAL (J E) L'acclimatement des blancs en pays chauds Deux exemples les maures du Hodt et la colonisation pénale en Guyane [Acclimatization of White Races in Hot Countries].—*Ann de Méd et de Pharm Colon* 1938. Oct.-Nov.-Dec. Vol. 36 No 4 pp. 882-914 With 2 graphs.

The first part of this paper consists of a description of the climatic conditions of the French Sudan and Algeria. The second part commences by describing how by the formation of a suitable microclimate immediately next to the skin by regulation of clothing man is able to adapt himself to arctic and tropical conditions in this respect differing from plants and animals. But the diseases indigenous to tropical countries constitute a greater danger than climatic conditions.

In Europe the seasons during which the heaviest agricultural work is necessary are spring and autumn, when temperatures are moderate but in the Sudan the heavy work must be done after the first rains in May and June at which time the sun is strong and humidity high. The effects of sunstroke and of light reflected from water sand and other surfaces are briefly described. Humid heat is responsible for heat stroke. At 15°C. three-quarters of heat loss in man is by radiation from the skin and one-seventh by evaporation of sweat. As external temperature rises the loss by radiation diminishes and that by sweat evaporation increases. It is therefore obvious that the humidity of the surrounding air is the important factor. The author considers that intestinal disturbances may be attributable to chilling of the sweat during the night and that diarrhoea may result. The kidney and liver functions are disturbed.

Rainy seasons in the tropics usually coincide with hot seasons and thus the most favourable conditions for the spread of the great endemic diseases malaria, yellow fever and sleeping sickness are created. Mosquitoes require water for breeding and the abundant vegetation which follows rain offers the necessary protection from the sun to the pupae of tsetse flies. Plague bacilli are best preserved in fleas at a vapour tension of 1-10 mm. and a temperature of 20-25°C. and plague incidence is greatest in the hot wet seasons.

The author considers that the resistance of peoples to indigenous diseases is a result of hereditary transmission of immunity. He quotes the mild types of yellow fever and typhus which occur in communities long exposed to these diseases, the malaria of preimmunized races and conversely the acute tuberculosis which may occur in native races to whom it is comparatively new.

For the white races in the tropics certain precautions are essential. Houses must provide a suitable micro-climate with protection from the sun and from disease vectors. Verandahs thick walls double roof and mosquito netting should be insisted upon. Clothing should be light and should not prevent the evaporation of sweat. Diet should be largely vegetarian but transition from European diet should be gradual. Work in the open should not be undertaken in the hot damp season between the hours of 10 a.m. and 4 p.m. Prophylaxis against disease by avoidance of vectors and drug prophylaxis should be employed, and the vaccinations advised are discussed.

The author quotes the successful preventive measures applied by CASTELLANI in the Abyssinian war [see thus *Bulletin* 1938 Vol. 35 p 628] and by the Americans in Panama, but these were disciplined communities. He gives a brief account of certain customs of the peoples

of French Africa and shows how white races (including Moors) fare badly in those parts originally inhabited by negroes and vice versa. Negroes transported to Guiana show more resistance than whites. Man has not yet successfully overcome geographical barriers. [See also this *Bulletin* 1939 Vol. 38 p. 423.] C. II

ZIEMANN (Hans) *Wie erobert man Afrika für die weisse und farbige Rasse?* [Conquest of Africa for the White and Coloured Races].—31 pp. [Refs. in footnotes.] 1939 Leipzig Verlag von Johann Ambrosius Barth.

ZIEMANN (Hans) *Zum Problem der Akklimatisation der weissen Rasse in den Tropen* [The Acclimatization of the White Races in the Tropics].—Reprinted from *C. R. Congrès International de Géographie Amsterdam 1933* Vol. 2. Section IIIc pp. 357-364.

BERLIN (Ch.) *Purpura solaris.—Harefnah* Jerusalem 1939 Jan. Vol. 16 No. 1 [In Hebrew pp. 1-10 With 2 figs. English summary p. 1.]

The author describes 25 cases of a condition in which haemorrhagic spots of varying size and form appear on the skin sharply outlined and occurring on unprotected parts and particularly on the backs of the hands. They are not painful and disappear spontaneously in 5-10 days leaving no pigmentation. If pressure be made with the thumb-nail for example, on the affected skin a "purpuric line" appears in 15-20 seconds formed of approximated petechiae. The author believes that the condition is due to the sun's rays and suggests the name *purpura solaris*. [Nothing is said of the diet or mode of life of these patients: the description is allied to that of various pellagroid conditions.] R. H. S.

MARSH (Frank) *Experiments in Heatstroke in Iran.—Trans. Roy. Soc. Trop. Med. & Hyg.* 1939, Nov. 28. Vol. 32. No. 3 pp. 371-394. With 12 graphs. [11 refs.]

Continuing his work on experimental heat-stroke Dr Marsh tentatively formulates a number of important conclusions in the present paper.

The rabbit, exposed to extremely high external temperatures and unable to sweat, relies mainly on hyper-ventilation and salivation for loss of heat. But survival appears also to depend on the ability to establish a new equilibrium at a high body temperature. And this seems usually to come about without any increase in the internal heat production. Those animals which do not adapt themselves satisfactorily to the heat exhibit the usual rise in metabolism. An important factor conditioning the reaction of an animal seems to be acclimatization. Animals exposed to heat on a number of previous occasions lie quietly and accommodate themselves well.

A further important matter brought to the fore in this paper is the sensitivity of the brain to heat. Whilst brain tissue is undoubtedly amongst the tissues most sensitive to heat the author considers its

power of survival to be greater than is usually thought. The determining factor is the period of exposure of the brain to the high temperature.

Thus the effects of heat may involve other bodily processes more seriously before damage to the central nervous system. Of the physiological processes probably concerned, the author discusses the ability of the circulatory system to withstand high bodily temperatures.

The work reported points once again to the necessity for immediately cooling the heat stroke patient. It stresses also the importance of acclimatization.

J S Weiner

ALAIN (M) & DELBOVE (P) Note sur deux cas d'infection à *B. whitmorei* observés chez des jeunes enfants. [Two Cases of Molloidosis in Children.]—*Bull Soc Path Exot* 1939 Jan. 11 Vol. 32 No 1 pp 20-24

The first of the cases here described is that of a child of 4 years a European presenting fever and diarrhoea with glairy blood-stained stools to the number of 30 in 24 hours. The child's condition became gradually worse with insomnia prostration and at times delirium. Six days after admission she complained of pain in the parotid region. A blood culture yielded a growth of *Pf. whitmorei*. Death took place two days later.

The second was a boy of 2 years also with diarrhoea. He showed signs of congenital syphilis. The blood contained *P. falciparum*. Four weeks after admission to hospital without apparent cause the child suffered from diarrhoea. 15 glairy blood tinged stools daily and the temperature rose to 39-40°C. From the stools *Ps. pyocyanea* was isolated which was pathogenic for guinea-pigs. Ten days after the onset of the diarrhoea the child developed a left-sided parotitis and a blood culture yielded *Pf. whitmorei*. Death occurred ten days later.

In neither case could any source of infection be discovered and the authors draw the strange conclusion that molloidosis is not a primary specific disease but secondary and due to exaltation or mutation of a saprophytic *pyocyaneus* into an organism with high pathogenicity and capable of setting up all sorts of morbid conditions. H H S

BAJOLET Glossites épidémiques des pays chauds. [Epidemic Glossitis in Warm Climates]—*Rev Prat Malad des Pays Chauds* 1938, Oct 17th Year Vol. 18 No 10 pp 441-4 447-8 451

Epidemic glossitis has been reported from Senegal and Madagascar but has been found also in Algeria, Tunis and France. The Senegal form is seasonal from December to March in Senegal during spring and summer in North Africa. It begins as a bright red circular erosion on the dorsum of the tongue near the tip with a dusky margin. This spreads rapidly and confluence produces an appearance resembling geographical tongue. In acute cases the tongue resembles that of scarlet fever. The lesion is painless except in the acute cases when the inside of the cheeks may be affected. Fever is uncommon.

Parotitis and involvement of the lymphatic glands may ensue the latter persisting after the healing of the tongue. The lesions progress until the 6th or 7th day after which they retrogress and cure is complete in 10 to 15 days.

The Madagascar form resembles this and streptococci are always found. It is probable that the Senegal form is also due to this organism. Treatment with sodium borate is advised and prevention by personal cleanliness and the search for carriers is advocated. C IV

DEJOU (L.) Aspects cliniques de la lymphangite endémique des pays chauds. [Clinical Aspects of Endemic Lymphangitis in Hot Climates.]—*Rev Prat Malad des Pays Chauds* 1938 Sept. 17th Year Vol 18 No 9 pp 393-6 399-400 403-4 407-8 411

Endemic lymphangitis which is a streptococcal infection must be differentiated from the lymphangitis which occurs in elephantiasis. It is an acute condition in which cellulitis accompanies the lymphangitis and may occur as nodules which sometimes suppurate in the subcutaneous tissues along the course of the inflamed lymphatic vessels. The corresponding glands are affected. Symptoms suggest a preliminary septicaemic phase and this has been confirmed by the discovery of streptococci in the blood of eight of the patients. Pyaemia may occur and may be indicated by patches of cellulitis occurring in various parts of the body. Chronic skin disease is the common precursor of endemic lymphangitis and no doubt forms a favourable portal of entry for the streptococci.

Treatment of the skin lesions by antiseptics especially perchloride of mercury is the most satisfactory method of prevention. [See also *Bulletin of Hygiene* 1939 Vol. 14 p. 508.] C IV

MOVRESTRUC (E.) Action de la di (p-acétylamino-phényl) sulfone dans le traitement de la lymphangite tropicale. [Di (p-Acetylaminophenyl) Sulphone in the Treatment of Tropical Lymphangitis.]—*Bull Soc Path Exot* 1938 Oct. 12. Vol. 31 No. 8. pp 694-695

The success attending the use of prontosil in experimental streptococcal infections led the author and others to study several sulphur derivatives. One of these β -aminophenylsulphanide (also designated 1162 F) proved even more successful than prontosil when given in an oily suspension to rabbits and rats with streptococcal infections and was tried in Martinique for patients with tropical lymphangitis. Still pursuing the study they evolved di (p-aminophenyl) sulphone (1358 F) but this, when tested in streptococcal and pneumococcal infections in mice, proved too toxic for beneficial use. They finally prepared di (p-acetylamino-phenyl) sulphone (1399 F) to which in France is given the name Rodilone.

Brief details of three cases are given. All suffered from severe lymphangitis associated with painful erysipelatous conditions and fever. Four tablets (comprimés) of rodilone were given daily in each case. In two of the patients the fever dropped and pain ceased in 24 hours but treatment was continued for a week. In the other is the statement crisis soon took place and the patient went out cured a week after coming under treatment. The author concludes that for treatment of such cases 1399 F is a valuable addition to the physician's armamentarium. [Since it seems to be unaccompanied by any toxic

symptoms it might be tried in cases of filarial lymphangitis. Unfortunately no indication is given as regards the dose beyond 'quatre comprimés']

YOUNG (W A) & BROWN (Mary H S) A Case of Esthiomène at the Sewa Hadji Hospital, Dar es Salaam—*East African Med J* 1938. Nov Vol 15 No 8 pp 262-266 With 3 figs. on 2 plates. [14 refs.]

A short note concerning a native woman admitted to the hospital in Dar-es-Salaam, suffering from the genito-anal syndrome of lymphopathia venerea. No active antigen was available for cuti reaction but the clinical picture of elephantiasis and ulceration of the pudenda with extension into the perineum and into the para vaginal tissues can leave little doubt as to the diagnosis. No stricture of the rectum was found but breaking down buboes in the groins were present. There was a considerable degree of anaemia and a septic temperature. Operative interference having proved useless the woman died.

H S Stannus

HEYNESSY (R. S F) Observations on Nephritis in Uganda Natives—*East African Med J* 1939 Jan Vol 15 No 10 pp 329-340

A fairly high incidence of albuminuria exists among non-nephritic hospital patients in Uganda and acute respiratory infections are responsible for a large number of these cases. Oedema may be misleading even when associated with urine which suggests nephritis as a cause. Of 34 such cases coming to post mortem none showed renal damage which could be held responsible for the condition and 20 could only be ascribed to nutritional oedema.

Cardiovascular hypertrophy is often absent in the proved nephritic patients and retinal lesions are extremely rare. Blood urea is often normal but the urea concentration test is valuable. The author gives an account of the pathological findings in a series of post mortem examinations and shows that kidneys of normal appearance removed from non renal cases often show proliferative glomerulitis and focal interstitial infiltrations. The common type of fatal nephritis shows proliferative hyalinizing glomerulitis but some resemble Russell's *nephritis acris* of *repens* variety.

The progress is often insidious and the author considers that the various infections especially pneumococcal to which the natives of Uganda are prone are probably aetiologically related to the local forms of nephritis.

C H

LAURENT (Damien) Les problèmes de l'enfance en Afrique Equatoriale Française (années 1935-38-37) [*Child Welfare Problems in French Equatorial Africa 1935-37*].—*Rev Méd et Hyg Trop* 1938 Mar-Apr & May-June. Vol 30 Nos 2 & 3 pp 57-86 121-146. With 15 figs. & 2 charts. [Summary appears also in *Bulletin of Hygiene*]

This paper is a record of two years' child welfare work in the Middle Congo (French Equatorial Africa). It is in two parts dealing respectively with social and medical problems.

Owing to the lack of vital statistics any estimate of infant mortality can only be approximate but the author considers that it is at least 50 per cent. for the whole region and in places as high as 80 per cent.

Women can be induced to attend antenatal clinics with fair regularity from the fifth month onwards, but the attention they receive is largely nullified by their unwillingness to come into hospital for labour owing to the strength of tribal customs. Nevertheless, antenatal clinics are of value because through them women establish contact with the dispensaries and bring their infants during the early weeks of life when the risks are high. Early visits to the homes by health visitors do much to prevent conditions such as tetanus, ophthalmia, sepsis of the cord and bronchopneumonia. Women are asked to bring their babies to the clinics at first twice weekly later once a week, and the greatest importance is attached to weight as a delicate index of health.

Starvation is an important cause of infant mortality. In the early weeks the breast milk is usually quite adequate but later through laborious work and underfeeding it is not. Unsuitable supplementary feeding is resorted to and the results are often disastrous. Cold leading to respiratory affections, is a common cause of death owing to the fact that the children are naked. Dirt leads to scabies and sores and secondary infections.

The native woman is not capable of feeding her child artificially. Consequently this must be done at the centres or in some cases prepared feeds are given to the mothers. Fortunately the native child, even if artificially fed in a somewhat rough and ready manner is remarkably free from digestive troubles. Clothing can be provided by voluntary effort and cleanliness inculcated by education of the mothers at the centres.

An account is given of the organization of the child welfare centres in the Bramaville district. Records show that out of 500 infants attending the centres regularly there was a mortality in the first year of 16 per cent.

The native infant of the Congo weighs at birth less than the European but this is made up by the end of the first month. Up to the end of the fourth month this advance is maintained, but later there is a slowing in the rate of increase and at the end of the first year the native child weighs less than the European.

Increase in height is a constant factor in the native child, and measurement is the most reliable method of ascertaining age.

Evidence of avitaminosis is found in arrested growth and oedema of the limbs. Infantile scurvy is not uncommon and rickets is one of the great scourges. Skin affections many of them the result of improper feeding are very prevalent.

Prematurity is of frequent occurrence. Syphilis is not the cause and the author attributes it largely to hard manual labour in the later months of pregnancy.

Respiratory diseases are of the first importance and are the cause of nearly half the infant mortality. Clothing does much to prevent them.

Malaria is universal after the first few weeks. Splenomegaly appears early and is found in 95 per cent. of the children from two to six years, after which it diminishes. Infants respond well to quinine which should be given only during febrile periods. The author recommends the hypodermic (not intramuscular) route for young infants.

Of the infectious diseases common in Europe, measles, whooping cough mumps chickenpox and poliomyelitis are met with. Of these

whooping-cough is the only one which is endemic and occurs throughout the year. Serious pulmonary complications of measles and whooping cough are rare. Venereal diseases and tuberculosis which are such a serious problem in women and children in civilized countries, are of much less importance in French Equatorial Africa.

This paper is illustrated by photographs and charts. It can be recommended to all who are interested in child welfare in Tropical Africa.

W. H. Peacock

REVIEWS AND NOTICES.

PORTER (Annie) [D.Sc. Lond. F.R.S.S.Af. F.L.S. etc.] *The Larval Trematoda found in Certain South African Mollusca with Special Reference to Schistosomiasis (Bilharziasis)*—*Publications of South African Inst Med Res* 1933 Dec Vol. 8 No 42. 492 pp. With 83 plates 1 map & 1 fig.

With enforced interruptions this monumental work was carried through while the writer was still on the staff of the Witwatersrand University Johannesburg and before she joined that of the McGill University Montreal. Its primary aim was to determine the snails which were concerned with the spread of schistosomiasis in South Africa. But seeing that snails there contained many other cercariae than those of the schistosomes of man that some of these others were furcocercous and that well meaning folk after finding fork tailed objects in local water or in snails had condemned the water and inflicted unnecessary hardship in a country where bathing is no mere luxury clear descriptions of 102 cercariae found in local snails are given. Of these 89 are listed as new species including 16 of the 17 furcocercous forms found and the descriptions of these cercariae occupy 274 pages but even so not all found are dealt with it being felt that when material was insufficient for proper description it was better to give no name to perplex future workers trying to identify what they found.

The total number of molluscs examined mainly in the fresh state was nearly 7000 belonging to 28 species a solid foundation for conclusions. One of these last is that there is individuality even in snails and experimental animals of the same species another way of expressing variation in nature. Thus an already infected snail rarely attracts miracidia of the same or other fluke species indeed in only eight of the snails examined were there larval trematodes of two species and individual rats vary so much in their reactions to infection that wrong conclusions may be drawn unless the habits and manners of each rat are already known. Another aspect of variability lies in the adaptation of young flukes to different snails. Thus in South Africa *S. haematobium* specially favours *Physopsis africana* but will also use *Ph. globosa*, *Bulinus tropicus* and *Lymnaea natalensis* again *S. mansoni* there uses *Planorbis pfeifferi*, *Ph. africana* and *B. tropicus* and *S. japonicum* has been found in two specimens of *L. natalensis* collected at the same time. There is in nature a constant association of the less susceptible with the more susceptible of these snails, and thus adaptability comes into action when the more susceptible species at that spot are already infected. Egg sizes are strikingly variable.

Among 1050 eggs of *S. haematobium* measured, the lengths varied from 80μ to 185.7μ , with most between 113μ and 133μ the widths were as variable. Next are described the egg of *S. spindale* with the larva bred in *Pl. pfeifferi* and of *S. bovis* with the larva bred in *Pl. africana*.

On the chemical and biological side it is shown that soapy water does not kill cercariae quickly enough to prevent their finding safety in the skin, that viable eggs have been found in soil, that a relatively short storage in urine or faeces kills them, and that drainage of marshy land has stopped infection. The route of entrance of miracidia varies in South Africa. Thus *Miracidium haematobium* preferably gains entrance into the snail by the respiratory opening but with such as penetrate the tentacle there are minute ripples lasting a few minutes which seem to mark its progress down this. *M. mansoni* however preferably attacks the tentacles causing tubercles and, it may be permanent deformity of these. The life of infected snails, as observed in the laboratory is much shortened (presumably by that destruction of the digestive gland which is figured) and the snails are sterilized by growth of young flukes in their gonads. The copious and excellent illustrations are nearly all from drawings and a map of the Union stippled to show the range of human infections, bears the legend that the distribution of molluscan hosts is much more extensive—a significant reminder of possibilities as ease of communication increases.

The writer points out the implications of the life-histories and leaves the application to medical men but at the same time she tells this significant story. The children in a small Indian settlement in the Union were interested in her snail collecting were told how the bad water made them itch, and were shown under the microscope cercariae coming out of snails. shortly the mothers came along and were told it all again, with stress thrown on the infection of the water. Next time she went that way she found that some of the pools had been filled in, others had been deepened, all the snails the people could collect had been burned, and the men had deepened the wells for drinking water.

In this monograph is summed up the investigations of thirteen years. It is a fine foundation for local work, a valuable pointer for work elsewhere in the world, and a stimulus as to what can and should be done there. For instance is not the rarity of double infections of snails a hint of the possibility (in certain conditions and perhaps as a second line of defence) of producing in them an infection by a larval fluke which does not live in man and if possible an infection heavy enough to kill or at least to sterilize the snails? There is in this monograph much to provoke thought and aid effective action.

Clayton Lane

GOTKARD (Pierre) [Chirurgien des Hôpitaux d'Alger] Pathologie chirurgicale de la rate. [Surgical Pathology of the Spleen].—174 pp. With 4 figs & 11 plates. 1909. Paris. Masson et Cie. 120 Boulevard Saint-Germain. [35 fr.]

This is a timely review of the present position of the surgery of the spleen for as the author points out the progress of treatment of leucæmia by radiotherapy and the modern curative treatments of pernicious anaemia and kala azar have reduced the former indications for splenectomy.

The comprehensive character of the book will appear from the fact that the injuries and diseases of the spleen are dealt with under twenty two sections. Ptoses torsions of the pedicle and injuries and ruptures are first dealt with in all the more serious forms of which splenectomy is indicated. Rupture of malarial spleens is of special interest to workers in the tropics and its operative mortality is placed at about 40 per cent. which is higher than in some Indian series of cases. Under abscess of the spleen the common tropical form due to amoebiasis is only referred to and its successful treatment by aspiration and emetine is not mentioned. In the septic cases prevalent in cooler climates the mortality is placed at 80 per cent.

Some two-thirds of the book are taken up with the interesting and difficult subject of the many varieties of splenomegaly. Clinical descriptions diagnosis prognosis and treatment of each are given and form a valuable contribution to the subject as the author throughout has adopted a critical attitude regarding the resort to splenectomy for many of the forms of enlarged spleen for which it has from time to time been advised and used. In fact the only class of case for which he unreservedly claims it as a surgical triumph is haemolytic jaundice. Other splenic conditions in which it may be recommended in carefully selected cases are purpuric conditions the forms of enlarged spleen in which splenectomy was originally advised by Banti splenic anaemia and Gaucher's disease and then only in the more severe types in which the prognosis under medical treatment is grave. The different varieties of cirrhosis of the liver are next dealt with. In the atrophic cirrhosis of Laennec operative procedures are ruled out. On the other hand splenectomy may sometimes be advisable in Hanot's hypertrophic cirrhosis in the presence of severe haemorrhages and anaemia although relapses occur and the ultimate prognosis is bad. The same applies to grave forms of gastro-intestinal haemorrhages without ulceration.

The last section of the book deals with surgical procedures by far the most frequent and important of which is splenectomy which is simple in the case of comparatively small unadherent organs but grave under the reverse conditions. This part of the subject is illustrated and should prove of as much service to surgeons in the tropics as other portions will be to physicians who have to advise patients regarding the possibilities of obtaining surgical relief in this difficult class of diseases. The book is well printed and in the usual paper cover of French works.

L. Rogers

LEWIS'S MEDICAL AND SCIENTIFIC LIBRARY Catalogue of Lewis's Medical & Scientific Lending Library Part II.—Classified Index of Subjects and Authors. New Edition. Revised to the end of 1937.—156 pp 1939 London H. K. Lewis & Co Ltd. 136 Gower Street W.C.1 [Pts. I & II complete 16s (to Subscribers 8s)] [Review appears also in *Bulletin of Hygiene*]

Part II of Lewis's Library Catalogue revised to the end of 1937 provides a classified index of the subjects covered by the Library with the names of authors who have written upon them. The compilers have not adopted any elaborate theoretical system of classification but have followed the practical course of listing the names of the authors of the 20 000 or so volumes in the Library under appropriate main subject headings arranged alphabetically, adding the dates of

publication and in some cases a word or two in brackets to indicate the particular aspects of the main subjects with which the books deal. From this information a reader can readily ascertain the names of authors who have written on a particular subject, and can then, by referring to Part I of the Catalogue already published (see this *Bulletin* 1939 Vol. 38 p. 182) obtain the full titles and some further information about the books *s.e.* their price and size. Thus Parts I and II of the Catalogue together besides providing subscribers with the titles of books available in Lewis's Library form a most valuable classified guide to English published books on medical and technical subjects.

R. L. S

TROPICAL DISEASES BULLETIN.

Vol. 36]

1939

[No. 12]

TROPICAL OPHTHALMOLOGY

A REVIEW OF RECENT ARTICLES XXXIV *

Trachoma—Some of the problems presented by the disease have been discussed by TABORISKY.¹ This observer has had an exceptional experience of trachoma in Palestine both amongst the school-children and the general population. He admits that competent ophthalmologists might disagree regarding the diagnosis of any particular case of trachoma in the early stage the progressive development of a deep conjunctival inflammation (hyperaemia thickening and papillary hypertrophy) followed later by the formation of follicles is however characteristic. In heavily infected areas the virus on occasion may reach the eye in such small quantity or with such attenuated virulence as to produce no reaction more often in such cases it may induce an inflammation which heals spontaneously or becomes chronic. A relative immunity may occasionally be present and should this be overcome a true trachoma though slight or atypical may develop.

BURNET CUÉNOD and NATAF² have noted how closely the cell inclusions found in trachoma resemble those seen in lymphogranuloma and suggest that those drugs which are useful in the experimental form of the latter disease might prove equally serviceable in the case of the former. They have therefore employed diammodiphenylsulphone in the treatment of trachoma and have recorded their results. These appear to be fairly promising and the authors consider they have made a step forward in the treatment of the disease. CHANG³ has treated eighty cases of trachoma with ten per cent. solution of quinine sulphate according to the method described by SELINGER and has formed a favourable opinion of its efficacy. The solution is rubbed for one minute into the conjunctiva by means of a cotton applicator. The treatment is carried out twice weekly at first and the sittings

* For the 31st of this series see Vol. 36 pp. 453-458.

¹ TABORISKY (J.) Sur les problèmes du trachome et les méthodes de leur solution.—*Rev. Internat. du Trachome* 1939 Apr. Vol. 16. No. 2. pp. 65-79 [20 refs.]

² BURNET (Et.) CUÉNOD (E.) & NATAF (R.) Essai de chimiothérapie du trachome par un dérivé glycosé du "4-4 diammodiphenylsulphone" efficace sur le pannus trachomatieux.—*Arch. Inst. Pasteur de Tunis* 1939 Mar. Vol. 23. No. 1 pp. 11-23.

³ CHANG (S. P.) Clinical Experiences with Quinine Treatment of Trachoma.—*Chinese Med. J.* 1939 May Vol. 55 No. 5. pp. 439-447

gradually reduced later. Some patients were found hypersensitive to the quinine and these developed an eczematous condition of the lids which subsided on ceasing the treatment.

STEWART⁴ has come to the conclusion that trachoma is caused by a virus whose most conspicuous form is the Prowazek Halberstaedter inclusion body. A free extra-cellular stage (the initial body) also exists: this resembles a pleomorphic bacterium. The initial body enters the cytoplasm of an epithelial cell and increases in size: several such may coalesce and form the kidney-shaped mass known as the Prowazek Halberstaedter body. Elementary granules which stain red with Giemsa subsequently appear in this body. Initial bodies both extra-cellular and intra-cellular stain a dark blue with Giemsa. Filtration through collodion membranes impermeable to bacteria is uncertain but the virus can be concentrated on the upper surface of such membranes. Baboons and grivet monkeys are susceptible to infection. The virus is killed by drying and infected cloths are dangerous for a short time only. The rôle played by lice in spreading the disease requires further investigation.

Assuming trachoma to be a Rickettsia infection POSTIC⁵ has continued the researches of DEREAC on the presence of the Weil-Felix reaction in trachoma. He obtained a positive reaction in 68 per cent. of trachomatous patients against a positive rate of 32 per cent. in non-trachomatous eye patients. One hundred and twenty cases of trachoma were tested and twenty five controls. TRAFESONTZEW⁶ believes that the Rickettsia found in the gut of lice inoculated with trachomatous material have no connexion with trachoma but are merely incidental. POLERY⁷ claims to have successfully cultivated trachoma Rickettsia *in vitro* by using tissue culture. Human placenta was found a suitable tissue but he suggests that corneal tissue obtained from a foetus or a recently deceased person might prove even more effective. Thin shavings of infected conjunctiva must be used for implantation mere scrapings are insufficient. The beneficial effect on the disease of an absence of such deleterious factors as scorching sun, heat, smoke and dust-laden winds has been noted by MOTAIS⁸. He had charge of 5 000 Tonkinese coolies working on rubber plantations in Cambodia and Cochinchina and found that only 0.5 per cent. showed signs of trachoma, whereas in Tonking their native country from 50 to 80 per cent. of the population is stated to be affected. The coolies were, of course medically inspected before recruitment, but even so the difference is striking and Motais believes that the favourable climatic conditions may be largely responsible.

⁴ STEWART (F. H.) The Aetiology of Trachoma.—*Brit. J. Ophthalm.* 1939, June, Vol. 23, No. 6, pp. 373-380. With 5 figs. [1 ref.]

⁵ POSTIC (S. etienne) L'importance de la réaction Weil-Felix dans le trachome ainsi que l'apport de l'étiologie Rickettsienne du trachome.—*Rev. Internat. de Trachome* 1939, Jan. Vol. 16, No. 1, pp. 31-39.

TRAFESONTZEW (C.) A propos des "Rickettsia" du trachome.—*Rev. Internat. de Trachome* 1939, Jan. Vol. 16, No. 1, pp. 40-47.

POLERY (L.) Passage des corpuscules Rickettsiens du trachome sur le tissu de l'oeil humain hors de l'organisme et quelques observations générales sur la culture des dites formations *in vitro*.—*Rev. Internat. de Trachome* 1939, Apr. Vol. 16, No. 2, pp. 72-87. [12 refs.]

⁸ MOTAIS (F.) Un changement de terrain et de conditions d'existence, peut-il ténifier la virulence de l'endémie trachomatose?—*Rev. Internat. de Trachome* 1939, Apr. Vol. 16, No. 2, pp. 88-92.

Glaucoma—Some points concerning *Epidemic Dropsy Glaucoma* have been recorded by KIRWAN.⁹ The disease is painless and all the more dangerous in consequence it usually occurs in the later stages of epidemic dropsy but may be accompanied by only mild signs of the constitutional disease if the intra-ocular capillary epithelium is specially susceptible to the toxin. Dietetic and medicinal treatment is unsuccessful and eserine is actually dangerous. Operative treatment is unnecessary as long as the visual fields remain unimpaired but it should be immediately adopted when field defects appear. A modification of Lagrange's operation is recommended as Elliot's operation though temporarily successful was often found liable to be followed by late complications. BHADURI¹⁰ advocates early recognition of the disease and stresses the importance of haloes as a warning symptom. He has found pilocarpine in two per cent. and four per cent. solution useful and has adopted Lagrange's operation with encouraging results.

Cataract—A review of the intracapsular operation for cataract has been made by BUXTON.¹¹ The opinions of many authorities are quoted by the author who himself had considerable experience at the Shikapur clinic. He prefers the classical operation and employs a corneo-scleral suture capsulotomy with Vogt's capsule forceps anterior chamber irrigation and peripheral iridectomy. He concludes that though the intracapsular operation may possess some advantages it involves an increased risk of certain complications. It may however be preferable for selected cases in such countries as India, where patients who require it are unlikely to return for a capsular discussion. The *Bulletin of the Ophthalmological Society of Egypt*¹² for the year 1938 records the proceedings of the Thirty fifth Session of the Society. The subject of retinal detachment led to an active discussion in which many members took part. Dr MAX MEYERHOF described some cases of sellar tumour which appeared to benefit from X ray treatment but he expressed the opinion that operation is the only sure therapeutic measure in the majority of the cases. Dr M. M. BAKRY claimed some striking successes in the treatment of optic atrophy by retrobulbar injections of atropin combined with measures taken to reduce the intraocular pressure together with suitable constitutional treatment.

H Kirkpatrick

- * KIRWAN (E. O. G.) The Treatment of Epidemic Dropsy Glaucoma.—*Trans Med College Rs-Union Calcutta* 1933-39 Vol 2. pp 179-182.
- * BHADURI (B. N.) Some Observations on Epidemic Dropsy Glaucoma.—*Trans Med College Rs-Union Calcutta* 1933-39 Vol 2. pp 186-188.
- BUXTON (Robert) Intracapsular Extraction of Cataract with Forceps.—*Brit Jl Ophthalm* 1939 Aug. Vol. 23. No 8 pp 505-539 [61 refs.]
- BULLETIN OF THE OPHTHALMOLOGICAL SOCIETY OF EGYPT 1938 Vol. 31 Session 35 pp. xxxvi + 118. With numerous illustrations.

PLAGUE.

PRÉCIS OF ABSTRACTS IN THIS SECTION

ANG *et al* (p 960) describe how in Fukien plague spread from the along the waterways to the interior. Small epidemics occurred after year to diminish after a decade but sporadic cases were in the interepidemic periods. The sanitary condition of many

Chinese towns is bad and rat infestation constant. Fumigation and poison bait are used and for shops the division of rat proofing measures to protect the three categories, bulk stock, replenishment stock and retail goods proved economically successful. The military authorities co-operated with the civil in an excellent organization.

RAO (p. 962) believes that plague is endemic, though frequently not recognized in Calcutta and suggests a systematic examination of the rodent population and an estimation of its relative immunity.

SURINI (p. 962) traces the history of plague in S. America. Anti plague measures in the ports have been conducted on well-known lines and in some instances have reduced the rat population by 70 per cent. ALFARADO and DE LA BARRERA (p. 962) report that in the Argentine sylvatic plague epizootics appear in winter and fade out in spring. Human infection is not common but may take the pneumonic form.

CASTELLANI (p. 963) describes a medium containing glycerol and rhamnose for the differentiation of *P. pestis* from *P. pseudotuberculosis rodentium*. RAO (p. 963) shows that the plague bacillus requires certain amino-acids for growth, but accessory growth factors are not essential.

TUMANSKY (p. 964) shows that *Proteus vulgaris* is antagonistic to *P. pestis* and this may account for the rapid disappearance of the latter in decomposing corpses, but plague bacilli can remain alive and virulent in rat or guinea-pig cadavers for 10 months or even longer in bone marrow uninfected by *Proteus*. RUSSO (p. 964) shows that virulence was not modified and considers that acari, which live on unimmunized rats, may become infected.

BREININGER (p. 964) relates the action of calcium chloride on *P. pestis* under various conditions. FAVORISKOVA (p. 965) describes the effect of phage on cultures of *P. pestis*.

RUSSO (p. 965) states that flesh eating flies of the genus *Sarcophaga*, in all stages of development, offer favourable conditions to the multiplication and diffusion of plague bacilli.

In Kenya, ROBERTS (p. 965) shows that the most important factor in the incidence of plague is the density of the *R. rattus* population. He (p. 965) reports that a high mortality in *field* rodents in Kenya was due not to plague but to Rift Valley fever. In the absence of proof it appears wrong to attribute outbreaks of plague in man to field rodents and their fleas.

VAN CAMPEKHOUT (p. 966) states that *Manomys aegandas* is a carrier of sylvatic plague in the Congo but *R. rattus* plays no part.

LOBANOV and FEDOROV (p. 966) note a distinct seasonal difference in the reaction of gerbils to plague infection. KORONKOVA *et al* (p. 967) conclude that agglutination reactions in *spermophiles* are not likely to be valuable in determining the epidemiology of plague.

In Western Canada GIBSON (p. 967) reports that no plague infection was found in 3,569 wild rodents and 7,582 rodent fleas examined. No infection with *Rickettsia dermatitidis* was found in a large number of ticks, but several were infected with *Bact. tularensis*.

JELLISON (p. 968) shows that predatory species of birds may transport flea infested rodents and may serve as accidental hosts of rodent fleas.

ESKEY and HAAS (p. 968) show that the fleas of wild rodents and of domestic rats are equally capable of becoming infected. They may harbour virulent plague bacilli in the gastrointestinal tract for as long as 130 days before becoming infective. For determining plague in

wild rodents the most effective method is the inoculation of the bodies of captured fleas into guinea pigs. The fleas should be killed by HCN and transmitted to the laboratory in 2 per cent salt solution DEVIGNAT (p 969) uses Broquet's medium (calcium carbonate 2, glycerin 20 distilled water 80) for clearing fleas for examination. This prevents putrefaction but ensures the survival of the bacilli up to six days so that they may be isolated for bacteriological examination. MURDOCK (p 969) records an outbreak of pneumonic plague in nurses attendants and doctors following the admission of a patient to hospital. Of 16 affected 15 died.

In a child described by FARINAUD (p 970) streptococci and later Gram negative bacilli were found in buboes. Inoculated guinea pigs died of acute plague and the streptococci were of low virulence.

Mice which ingested M & B 693 to the amount of about 2 mgm per gm. weight daily and which were inoculated with 10 000 lethal doses on the 5th or 6th day ingestion of the drug being continued thereafter survived. DURAND (p 970) reported that larger infecting doses often proved fatal but even then the bacilli could not be recovered from the dead animals. Most of the surviving animals showed considerable immunity. SCHUTZE (p 971) shows that white mice are less resistant to plague than white rats. M & B 693 soluseptasine and sulphone were given before or with the infection to these animals and it was found that M & B 693 was the most successful. Serum prepared against the Otten living vaccine was about equal to M & B 693 in prophylaxis and the author suggests that a combination of these might be better than either alone. GIRARD and GIRARD (p 971) found M & B 693 to be as efficacious as plague serum in the treatment of infected mice and guinea pigs.

BEARGAVA (p 971) gives advice on the protection of coolie workers in an anti plague campaign. JAMES (p 972) considers that the vigorous measures taken prevented an outbreak in the Mawchi mines in India. BABENUSHEV *et al* (p 972) show that fumigation of the burrows of ground squirrels with chloropicrin or calcium cyanide though not entirely eradicating the fleas in the burrows reduces their numbers. TIFLOV and POTAPOV (p 973) found that the majority of all species of rodent fleas in Russia migrate from burrows of field rodents when these are abandoned. TROTTER (p 973) remarks on the successful use of poison bait and other anti rat measures in Hawaii.

The Eastern Bureau of the Health Organisation of the League of Nations (p 973) reports that in India plague has steadily declined in the last 10 years. The same is true of the Dutch East Indies where the decline has coincided with mass inoculation by Otten's living avirulent vaccine. To be successful fumigation should be repeated every 3 months. ROSIER (p 974) attributes the decline of plague in Java, of which he gives figures firstly to the use of the living vaccine of Otten of which over 6 million inoculations have been given since 1935 and secondly to the campaign of house improvement. SCHUTZE (p 974) reports on field trials of vaccines in Java. With heat killed vaccine no superiority of virulent strains over avirulent or of smooth over rough was seen but for maximal protection of rats it is essential that the vaccine be grown at 37°C at which temperature envelope antigen production is highest. In mice however envelope antigen is not so important. The superiority of smooth avirulent living vaccine depends on the capacity for survival in the inoculated animal a rough strain is more quickly suppressed.

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Chinese towns is bad and rat infestation constant. Fumigation and poison bait are used and for shops the division of rat proofing measures to protect the three categories bulk stock, replenishment stock and retail goods proved economically successful. The military authorities co-operated with the civil in an excellent organization.

RAO (p. 962) believes that plague is endemic, though frequently not recognized, in Calcutta and suggests a systematic examination of the rodent population and an estimation of its relative immunity.

SUSSINI (p. 962) traces the history of plague in S America. Anti-plague measures in the ports have been conducted on well known lines and in some instances have reduced the rat population by 70 per cent. ALVARADO and DE LA BARRERA (p. 962) report that in the Argentine sylvatic plague epizootics appear in winter and fade out in spring. Human infection is not common but may take the pneumonic form.

CASTELLANI (p. 963) describes a medium containing glycerol and rhamnose for the differentiation of *P. pestis* from *P. pseudotuberculosis rodentium*. RAO (p. 963) shows that the plague bacillus requires certain amino-acids for growth, but accessory growth factors are not essential.

TUMANSKY (p. 964) shows that *Proteus vulgaris* is antagonistic to *P. pestis* and this may account for the rapid disappearance of the latter in decomposing corpses, but plague bacilli can remain alive and virulent in rat or guinea-pig cadavers for 10 months or even longer in bone marrow uninfected by *Proteus*. RUSSO (p. 964) shows that virulence was not modified and considers that acari which live on mummified rats, may become infected.

BREITINGER (p. 964) relates the action of calcium chloride on *P. pestis* under various conditions. FAVORISKOVA (p. 965) describes the effect of phage on cultures of *P. pestis*.

RUSSO (p. 965) states that flesh eating flies of the genus *Sarcophaga*, in all stages of development offer favourable conditions to the multiplication and diffusion of plague bacilli.

In Kenya, ROBERTS (p. 965) shows that the most important factor in the incidence of plague is the density of the *R. rattus* population. He (p. 965) reports that a high mortality in field rodents in Kenya was due not to plague but to Rift Valley fever. In the absence of proof it appears wrong to attribute outbreaks of plague in man to field rodents and their fleas.

VAN CAMPENHOUT (p. 966) states that *Mastomys ugandae* is a carrier of sylvatic plague in the Congo but *R. rattus* plays no part.

LOBANOV and FIDOROV (p. 966) note a distinct seasonal difference in the reaction of gerbils to plague infection. KUSOBKOVA *et al* (p. 967) conclude that agglutination reactions in spermophils are not likely to be valuable in determining the epidemiology of plague.

In Western Canada GIBSONS (p. 967) reports that no plague infection was found in 3,569 wild rodents and 7,582 rodent fleas examined. No infection with *Rickettsia dermatitoxenus* was found in a large number of ticks, but several were infected with *Bact. tularensis*.

JELLISON (p. 968) shows that predatory species of birds may transport flea infested rodents and may serve as accidental hosts of rodent fleas.

ESKIN and HAAZ (p. 968) show that the fleas of wild rodents and of domestic rats are equally capable of becoming infected. They may harbour virulent plague bacilli in the gastrointestinal tract for as long as 130 days before becoming infective. For determining plague in

wild rodents the most effective method is the inoculation of the bodies of captured fleas into guineapigs. The fleas should be killed by HCN and transmitted to the laboratory in 2 per cent. salt solution. DEVIGNAT (p 969) uses Broquet's medium (calcium carbonate 2, glycerin 20 distilled water 80) for clearing fleas for examination. This prevents putrefaction but ensures the survival of the bacilli up to six days so that they may be isolated for bacteriological examination.

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VOGEL and RIOU (p. 975) show that in Madagascar the incidence of plague has markedly decreased in 1936-1937 compared with previous years. During 1937 vaccination with the living EV vaccine was performed on 77.5 per cent. of the population of 1,051,395 and the authors attribute the decline of the disease to the use of this vaccine. AKCHEZAR (p. 976) gives the characteristics of the EV strain of *P. pestis*.

SOKHEY (p. 976) gives the desiderata for the preparation of vaccines of killed plague bacilli and quotes an experiment in which treatment with antip plague serum gave promising results. The composition of the rat population of Bombay is changing. *R. rattus* and *R. norvegicus* are now highly resistant to plague, but *Gomomys varis* is increasing and is highly susceptible. He gives the growth requirements of *Pest. pestis*. He also (p. 977) states the minimum mouse-protection doses of vaccines prepared by different methods and at different temperatures.

In Brazil apart from deratization on the usual lines, vaccination with heat killed vaccines has been used. BARRETO (p. 977) reports that the disease has been relatively mild. In plague epidemics SILVETTI (p. 977) shows that vaccination produces an undesirable negative phase and prefers to rely on provision for the sick, segregation, disinfection and deratization. BISTREIN (p. 978) for the preparation of sugar vaccine, autoclaves the sugar at pH 6-8, afterwards neutralizing with sterile alkaline solution. In this way the production of acid is prevented.

BAHR (p. 978) shows that the ratin bacillus has undergone little change in 31 years. Rats which survive ratin ingestion may be killed by means of the squill preparation ratinin, though this is not satisfactory for field mice. C IV

YANG (Y. N.) LANDAUER (E.) KOO (C. K.) & LIN (P. C.) Plague Work in Fukien, China, December 1935 to November 1938.—*Chinese Med. J.* 1939, Jan. Feb., Mar., Apr. & May. Vol. 55 Nos. 1, 2, 3, 4 & 5 pp. 55-73, 162-173, 262-275, 383-390, 479-487. With 24 figs.

In the pandemic of plague which started from Hong Kong in 1894 the neighbouring province of Fukien situated opposite the island of Formosa was soon involved. Its two principal ports, Amoy and Foochow became infected in 1894 and 1901 respectively. The present account relates to plague work during 12 months which was started as a result of a severe outbreak of plague at the end of 1935 in Southern Fukien. It deals in a series of chapters with the organization of the provincial plague prevention bureau, an epidemiological survey, sanitary surveys of endemic plague areas, preventive measures and finally, with a rat and flea survey of Lungyen, a town 100 miles up river and the headquarters of the group of workers.

In early days the plague infection was dispersed by rats and fleas in merchandise from the seaports by river into the interior. As most of the province is mountainous, the bulk of inland trade is confined to the waterways and the seaports provided primary endemic plague foci. Some interesting information has been collected of the history of plague development in certain limited areas. On entering such an area the result of infection was a few sporadic cases or a mild outbreak. More or less severe outbreaks followed in subsequent seasons with or without an interval of from one to three or four years.

After a decade of periodical recurrences of epidemics the outbreaks became milder again and in some places the disease disappeared altogether. But the interepidemic intervals continued to show sporadic cases and these were very important as an index of the prospects of epidemic outbreak. The rat communities on farms are rapidly exterminated in an epizootic and as these farms are separated from one another by almost impossible country the epizootic may die out completely. But on the other hand transmission to another area might be effected human sporadic cases would occur and the stage was then set for appearance of a small epidemic. Even so-called sporadic cases however must really be regarded as true miniature epidemics. Villages likewise may be the source of reinfection of a new and susceptible rat population in the towns. No differences could be observed in the way in which plague attacked human beings in the matter of sex age or occupation. It does not seem to have been possible in the present investigation to obtain actual data of length of the incubation period of plague but from the fact that dead rats were always found 4-6 days prior to the onset of the disease in human cases the incubation period must be within this limit. Pneumonic plague is rightly feared in China but in the present year's epidemic only two cases of secondary pneumonia occurred in two bubonic cases. One of these gave rise to a small pneumonic epidemic of 4 persons in the same house.

A most interesting albeit melancholy account is given of present-day sanitation in many Chinese towns. Water supply is from wells often in a state of disrepair sewers are open channels latrines are of varied types and human faecal matter is much in request for fertilizer garbage disposal is still frequently primitive and streets and housing are not sanitarily satisfactory. It may be said indeed that conditions generally are highly favourable to rat infestation although this must be ascribed very largely to the impoverishment of the people. Certain differences are noted in the architecture of North and South Fukien but over the whole province rat infestation is almost a regular state of affairs.

Preventive measures adopted for the control of plague follow the usual lines. Rat burrows were treated by the calcium cyanide method of fumigation and a house-to-house distribution of poison bait was made by the fumigators. Rat proofing measures for shops took into account the protection of (1) bulk stock (2) replenishment stock and (3) retail goods. Economically this division of rat proofing methods into three classes was a conspicuous success that kept the total costs of the campaign very low. The methods also constituted a welcome insurance for the shopkeeper of protection of his goods against spoilage and consumption by rats. In Lungyen great help was accorded to the work of rat-harbourage elimination and rat proofing by military as well as civil authorities. The staff of the 10th Army assisted in the conducting of several clean-up campaigns each taking nearly a week's work of over one hundred inspectors. Rules governing the construction of new houses were discussed with the local authorities as regards method of enforcement and distributed in pamphlet form to the local building constructors.

A chapter on the rat and flea survey of Lungyen is the last of this series. A total of 2,345 rats trapped during the year was submitted to examination and the species of fleas found were —*X cheopis* L. *musculi* M. *anisus* and *N. nicanus*.

The account of plague work given in these articles shows evidence of excellent organization and very praiseworthy co-operation between all the authorities concerned.

W F Harvey

RAO (S Raghavender) Some Observations on Plague in Calcutta.—*Calcutta Med. J.* 1939 Aug Vol 36 No 2, pp 89-105 With 5 figs.

The long-continued absence of epidemic plague from Calcutta is well known but has scarcely been fully studied. Sporadic cases of plague have occurred at infrequent intervals and attract but little attention. It was the occurrence of such a case in a bostee or group of huts which led the author to take up a more intensive investigation of the problem especially as regards the possibility of importation. His work has shown that even in such a very small population as that of a bostee deaths may be occurring which may be plague and that the known factors of rat density, flea infestation, climatic conditions of temperature and humidity in Calcutta are less unfavourable to the development of plague than elsewhere. He found no evidence to support the contention that the case of plague in question was imported and he is led to suggest that plague cases would be found if looked for and that some systematic examination of the rodent population, including the bandicoot as well as the smaller rodents is desirable. Such an examination would naturally take up the question of the relative immunity of the Calcutta rodent population to plague infection.

W F H

BOLETIN SANITARIO. Buenos Aires. 1938 Nov Vol. 2, No 11 pp. 802-815 With 5 figs.—Antecedentes epidemiológicos de la peste en los puertos de la República Argentina. [Epidemiological History of the Entry of Plague in the Ports of the Argentina.]—Informe presentado a la X Conferencia Sanitaria Panamericana por el Presidente del D.N. de H. Dr Miguel SURSINI.

It was in 1899 that plague was introduced to South America by a Dutch steamer calling at Montevideo with a cargo of rice from India. From Montevideo the cargo after transference to another steamer was taken to Asuncion in Paraguay and by this time an epizootic of plague had broken out and there were also plague cases. The further progress of plague by river brought it to Rosario and then to Buenos Aires in the Argentine Republic. Spread to the ports of the Argentine generally was then only a matter of time. In these ports the difficulties of conducting an anti-plague campaign of sanitation and deratization are very great. They proceeded on the well-known lines and have led to an extraordinary diminution of rats in the ports which has in some cases reached 70 per cent.

W F H

BOLETIN SANITARIO. Buenos Aires. 1938 Nov Vol. 2, No 11 pp 816-822 With 1 fig.—Peste rural en la República Argentina. [Rural Plague in the Argentina.] Informe presentado a la X Conferencia Sanitaria Panamericana por el Presidente del D.N. de H. Dr Miguel SURSINI (Preparado por los Dres. C. A. ALFARADO y J. M. DE LA BARRERA).

In the Argentine as in other countries the type of plague known as sylvatic has assumed importance because of its tendency to appear in

epizootic form and to spread over a wide extent of country. The epizootic makes its appearance during the winter and fades out in spring. It reappears again the following winter. The infection in animals is of subacute type and death may take place without much in the way of macroscopic lesion. Among the animals affected are *Microcavia australis*, *Galea musteloides*, *Graomys griseoflavus* and to a less extent *Lepus europaeus*, *Hesperomys murillus* and *Sylvilagus brasiliensis*. The parasitic *Siphonaptera* are represented by species of the genera *Parapsyllus*, *Thopalopsyllus* and *Hectopsylla*.

One of the features of sylvatic plague is the small amount of human infection which is experienced. This however is somewhat offset by the tendency to production of pneumonic plague. W F H

CASTELLANI (Aldo) Brief Note on a Culture Medium used in the Differentiation between *B. pestis* (*Pasteurella pestis*) and *B. pseudotuberculosis rodentium* (*Pasteurella pseudotuberculosis rodentium*) — *Jl Trop Med & Hyg* 1939 June 1 Vol. 42, No 11 p 158. With 1 coloured plate [Summary appears also in *Bulletin of Hygiene*]

The author proposes a method for cultural differentiation of *P. pestis* from *P. pseudotuberculosis rodentium* by their action in media containing glycerol and rhamnose. The latter produces acidity in one or both of these whereas the former does not. The composition of the medium used is Rhamnose 1 gm, glycerol 4 cc, litmus solution (Kübel and Tiemann) 5 cc, agar 2 gm, water to 100 cc, pH 7.2.

In this *P. pestis* effects no change in colour unless perhaps to darken the blue whereas ten out of eleven strains of *P. pseudotuberculosis rodentium* changed the colour to red in two days and the remaining strain gave a similar though delayed, reaction. The author states that all strains of the latter do not ferment both, some produce acidity in glycerol but not in rhamnose, some in rhamnose and not in glycerol.

H H S

RAO (M. Sadashiva) The Nutritional Requirements of the Plague Bacillus — *Indian Jl Med Res* 1939 July Vol. 27 No 1 pp 75-89 [23 refs.]

Very interesting work has been done in late years on the nutritional requirements of microorganisms. The autotrophic bacteria regarded as on a low level of evolution, can assimilate carbon dioxide whereas the heterotrophic bacteria are dependent on ready elaborated carbon compounds. The most primitive types of bacteria again can assimilate their nitrogen from inorganic sources, at a higher level amino-acids such as tryptophane may be necessary for nutrition and at the highest level of development not only are a series of amino-acids necessary but also certain accessory growth factors or bacterial vitamins are indispensable. Pathogenic bacteria belong mostly to the last class. The present study is directed to determine whether the plague bacillus can be grown in a simple chemically defined medium, what accessory factors are necessary, any nutritional differences between virulent and avirulent strains, what amino-acids are essential as growth factors. The principal findings are — (1) Three amino-acids

proline, phenylalanine and cystine are indispensable while the presence of glycine though not essential, is stimulatory (2) Accessory growth factors have no essential rôle in the nutrition of the plague bacillus. (3) Virulent and avirulent strains show little difference in nutritional requirements. W F H

TUMANSKY (V) Influence de *B. proteus vulgaris* sur le *B. pestis*. [Influence of *Proteus vulgaris* on *Past. pestis*.]—*Rev. Microbiol., Epidemiol. et Parasit.* Saratov 1938. Vol 17 No. 1-2. [In Russian pp 20-27 French summary pp. 27-28.]

Proteus vulgaris is antagonistic to *P. pestis* which finally disappears if the two organisms are cultivated together. This action of the *Proteus* organism is exercised only in living culture. Neither dead cultures nor bouillon culture filtrates possess any such effect. The virulence of the plague bacillus is at the same time diminished. It is understandable how plague bacilli disappear in decomposing human or animal bodies, for the putrefaction is to a considerable extent due to *Proteus* organisms. In a body kept at 25°-30°C the virulence of plague diminishes very rapidly much less rapidly at 12°-15°C. W F H

RUSCO (Carlo) Persistenza di vitalità e virulenza del bacillo della peste nel midollo osseo. [Viability and Virulence of Plague in Bone Marrow]—*Rendiconti Istituto di Sanità Pubblica*, Rome. 1939 Vol 2 Pt 1 pp 197-200

The importance of the examination of the bone marrow in plague rats, especially if long dead, has been abundantly confirmed. In these experiments the author has been able to show how long the plague bacillus may maintain itself alive and virulent in rat or guinea-pig cadavers. He found that this time extended to 8 or 10 months and that after 10 months pure cultures of the plague bacillus, without contamination by the putrefactive *Proteus* organism, could be obtained from the bone marrow of the femur. The vitality and virulence of the plague bacillus moreover had not undergone any modification during this time. Such survival of the plague bacillus permits acari, which live on the bodies of mummified rats to become infected. W F H

BREITINGER (D) Action de la chlorure de chaux sur le bacille pesteux. [Action of Calcium Chloride on the Plague Bacillus].—*Rev. Microbiol. Epidemiol. et Parasit.* Saratov 1938 Vol 17 No 1-2. [In Russian pp 116-119 French summary p 120.]

A 2½ per cent. solution of calcium chloride kills a bouillon culture of plague in 10 minutes. Scraps of cloth infected with a 24-hour culture exposed to the action of a 10 per cent solution are sterilized in 10 minutes. A 20 per cent solution does not kill plague bacilli in sputum after 24 hours action nor in the dead bodies of spermophiles after 36 hours. W F H

SHIMLEY (A) & FEDOROV (A) Disinfectants and the Plague Bacillus.—*Rev. Microbiol. Epidemiol. et Parasit.* Saratov 1939 Vol 17 No 1-2. [In Russian pp 104-111 English summary p 111.]

FAVORISOVA (B) Modifications morphologiques du *B. pestis* sous l'action du bactériophage [Morphological Modifications of the Plague Bacillus by Bacteriophage]—*Rev Microbiol Epidemiol et Parasit* Saratov 1938 Vol 17 No 1-2. [In Russian pp 11-17 French summary pp 17-19 With 35 figs.]

The action of bacteriophage in inactivated human serum and bouillon cultures on virulent *P. pestis* was studied in films prepared every five minutes during the first 12 hours of incubation and then at intervals of 24 48 72, 96 and 121 hours. The atypical forms which made their appearance during 121 hours in the serum culture were describable as rod-shaped round, pyriform semilunar and curved. In bouillon the same transformations took place but so rapidly that at the end of two hours there was nothing to be seen at all in the films.

W F H

RUSO (Carlo) La propagazione del bacillo della peste in rapporto alla metamorfosi di insetti coleotteri ed acari [Propagation of the Plague Bacillus in Relation to the Metamorphoses of Coleopterous Insects and Acari]—*Rendiconti Istituto di Sanità Pubblica* Rome. 1939 Vol 2 Pt 1 pp 175-196 [25 refs.]

Flesh eating flies of the genus *Sarcophaga* offer favourable conditions to the multiplication and diffusion of the plague bacillus at all stages of their metamorphosis. The author has found that quite a number of invertebrates, that is to say the ectoparasitic and endoparasitic insects of the morderae and some arthropods can contract plague infection and become true reservoirs of plague bacilli and thus the intermediate sources for the conveyance of infection. IV F H

ROBERTS (J I) Rat and Flea Conditions in a Rural Endemic Plague Area in Kenya.—*Jl Hygiene* 1939 July Vol 39 No 4 pp 355-390 With 4 figs.

Tables give the results in detail of a survey of rats and fleas in the main endemic plague area of Kenya over a further period of two years and graphs deal with rainfall and human plague numbers of *R. rattus* and *X. brasiliensis* index rat plague and human plague for the periods 1934-5 1935-6 and 1936-7. These figures and graphs demonstrate that the factor exercising the greatest influence on the incidence of plague is the *Rattus* population density that the period of maximum incidence of fleas per rat agrees closely with the higher incidence of plague that endemic areas have a much higher *Rattus* density and higher breeding rates than plague-free areas and that the incidence of plague both in man and rats is more closely associated with rat population than any other factor. IV F H

ROBERTS (J I) The Relationship of Field Rodents to Plague in Kenya.—*Jl Hygiene*. 1939 May Vol 39 No 3 pp 334-344

The importance of an increase in the breeding rate and in the mortality rate of field rodents has been greatly stressed of late years in

connexion with the spread of plague epizootics to distant places. This sylvatic plague question is a serious one for public health authorities. In Kenya the matter has been approached essentially from the point of view of proof firstly of the fact and secondly of its importance for human plague. A high mortality among field rodents in the Rift Valley coexistent with an outbreak of disease among sheep was shown not to be plague but what is now known as Rift Valley fever. Bacteriological examination for plague in wild rodents over many years has not shown a single "field rat naturally infected with the disease." During 1930-31 when large numbers of field rats were dying in and around Nairobi a total of 2,750 field rats—*M. coucha*, *Arvicanthus* and *Otomys*—were examined with negative results. In transmission experiments during an outbreak of plague whereas *X. cheopis* and *X. brasiliensis* from rats in huts were easily shown to be vectors experiments with 469 *Ctenophthalmus cabirus* and 816 *Diopsyllus hyssurne* acquired from field rats, in the same area also suffering from an epizootic disease "proved negative.

In the summary to this article one of the conclusions reached for Kenya is that "In the absence of any confirmatory bacteriological evidence to prove that epizootics among field rats are caused by *B. pestis* and the failure to find natural infection among field fleas together with the knowledge of their aversion to feed on man and lack of opportunity to develop such tastes the theories that field rodents and their fleas "are definitely concerned in the spread of plague or in the initiation of outbreaks of plague "appear to be fallacious."

W F H

VAN CAMPENHOUT (J) La peste au Congo Belge en 1937 [Plague in the Belgian Congo in 1937]—*Bull. Office Internat. d'Hyg. Publique* 1938, Dec. Vol. 30 No. 12 pp. 2747-2749. With 1 map

The only focus of plague (sylvatic) of the Colony at Lake Albert, produced 6 cases in 1937 of which 3 were bubonic 2 pneumonic and 1 septicaemic. It was found that the rat *Mastomys agardii* is a carrier but *E. rattus rattus* plays no part in the endemic. Of the fleas found on rodents *Xenopsylla cheopis* and *brasiliensis* are in a large majority while *Leptopsylla*, *Diopsyllus*, *Ctenocephalus*, *Sarcopsylla*, *Ctenophthalmus* and *Neopsylla* have also been met with.

W F H

LOBANOV (N) & FEDOROV (N) On Pathogenesis of Experimental Plague in Southern Gerbils (*Pallasiomys meridianus* Pall.)—*Rev. Microbiol. Epidemiol. et Parasit. Saratov* 1938 Vol. 17 No. 1-2 [In Russian pp. 57-70 English summary pp. 70-71]

The authors met with a distinct seasonal difference of reaction in gerbils which were experimentally infected with plague. From April to July the type of disease induced was comparatively benign and remained localized. The micro-abscesses produced became encapsulated absorbed and finally replaced by connective tissue, cicatrizing elements. From July to October on the other hand the plague induced was to a large extent acutely septicaemic and generalized.

W F H

KOROBKOVA (E) FAVORISSOVA (B) & KRAINOVA (A) Sur la valeur diagnostique des réactions sérologiques dans l'immunité antipesteuse chez les spermophiles [Diagnostic Value of Serum Reactions in Spermophiles].—*Rev Microbiol Epidemiol et Parasit Saratov* 1938. Vol. 17 No 1-2 [In Russian pp 72-86 French summary pp 86-87]

If the serum of spermophils gave retrospectively an agglutination reaction to plague this would be of assistance in marking down a suspected enzootic area especially if this reaction occurred in the older animals and not in the younger. Experiments in the laboratory on 200 spermophils caught in a non plague area showed—(1) The serum of healthy spermophils often agglutinated formalized cultures of the plague bacillus in dilutions between 1-10 and 1-40 (2) Immunization of spermophils with 3 injections of weakly virulent living plague on 3 successive days resulted in production of a feebly agglutinating serum (1-10 to 1-50) by the second week and disappearance of the agglutination after 25 days (3) Spermophils immunized with living bacilli are protected against a very severe test dosage (4) Specific agglutinins appear in the serum only after numerous injections of living bacilli but a single injection is sufficient to confer immunity.

The conclusion drawn is that agglutination reactions are not likely to prove of much value in determining the epidemiology of a district

W F H

GIBBONS (R J) Survey of Rocky Mountain Spotted Fever and Sylvatic Plague in Western Canada during 1938.—*Canadian Public Health Jl* 1939 Apr Vol. 30 No 4 pp 184-187

A co-operative survey has been undertaken for the determination of the existence and the danger of occurrence of the two diseases Rocky Mountain spotted fever and wild rodent or sylvatic plague in the Canadian provinces of Alberta and British Columbia. No plague infection was found in the 3 669 wild rodents and 7,582 rodent fleas examined. That is matter of congratulation but does not imply that there should be any relaxation of vigilance as the history of the progress of the infection northward and eastward through the western section of the United States makes probable its extension to Western Canada within the next few years.

Investigation of the reports of Rocky Mountain spotted fever revealed that though the first case had only been notified from Alberta in 1935 and from British Columbia in 1936 fully authenticated cases had occurred as early as 1923 in Alberta and 1917 in British Columbia. Laboratory examination of specimens of the ticks *Dermacentor andersoni* and *D. variabilis* for *Rickettsia dermatitoxenus* were negative although the ticks had been collected in large numbers in the immediate vicinity where cases had occurred. In the course of these examinations several specimens were found to be infected with virulent strains of *P. tularensis* [sic]

W F H

ROUDABUSH (Robert L.) Survival of the Tropical Rat Flea in United States.—*Science* 1939 Jan. 27 Vol. 89 No. 2300 pp 79-80

JELLISON (William L.) *Sylvatic Plague Studies of Predatory and Scavenger Birds in Relation to its Epidemiology*—*Public Health Rep* 1899 May 12. Vol 54 No 19 pp. 792-798.

It seems quite possible that flesh-eating birds, especially those depending on rodents "as an important source of food supply might be an important factor in the spread of plague. Again, birds might be agents of transportation to a distance of plague infected fleas. The booby owl for example is a constant companion of the ground squirrel occupying the same burrows with him. The field and laboratory observations reported here were made in a plague epizootic area. Predatory species of birds were found to transport flea-infested rodents and to serve as accidental hosts of rodent fleas. Experimentally, casts from predatory birds fed plague-infected guinea-pig tissue were consistently infectious. In general no very positive conclusion seems to have emerged from these studies.

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ESKEY (C. R.) & HAAS (V. H.) *Plague in the Western Part of the United States. Infection in Rodents, Experimental Transmission by Fleas, and Inoculation Tests for Infection*—*Public Health Rep* 1899 Aug 11 Vol 54 No 32 pp 1467-1481

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The determination of the existence of plague infection in the wild rodents of a territory has now become a regular epidemiological procedure. Inoculation of guinea-pigs with the bodies of captured fleas has been found to be a much more effective means of finding rodent plague infection than by systematic examination of the killed animals themselves. An important discovery was that the parasites

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DEVIGNAT (R) L'utilisation du milieu de Broquet pour la recherche de la peste des puces. [Broquet's Medium for Examination of Plague Fleas.]-*Ann Soc Belge de Méd Trop* 1938 June 30 Vol. 18. No 2. pp 215-219

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MURDOCK (John R.) Peste pulmonaire à Riobamba (Equateur) [Pneumonic Plague at Riobamba (Ecuador)]-*Bull Office Internat d Hyg Publique* 1939 June Vol 31 No 6 pp 1022-1023

This account is of a sharp short epidemic of pneumonic plague lasting only a few weeks and giving rise to 15 deaths out of 16 cases. After the first case had been admitted to hospital there followed rapidly the contact infection of nursing sisters attendants and doctor. All were cases of pneumonia and only one nursing sister survived. A diagnosis was made by exhumation of one of the fatal cases removal

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attendant upon his work. The dangers are of course, from fleas and from the poison gas of disinfection. It is recommended that his clothing should be white and so disposed that fleas can get no access to the skin anywhere while he should wear a glove of thick rubber reaching from fingers to elbow as protection during cyanogassing. Coolies should work in batches of two so that one can keep a watch on the other for fleas. It is important likewise that hours of work should not be too long nor too continuous lest the workers become careless and off their guard against infected fleas.

A note to this article gives as simpler methods (a) protection of workers by inoculation with antiplague vaccine (b) wearing of white overalls and (c) smearing of the hands up to elbows and legs up to knee with kerosene-soap emulsion daily just before starting the work. If cyanogassing is done with calcid briquettes it carries little danger to either worker or public
W F H

JAMES (E. R.) The Incidence of Plague in Mawohi Mines and the Advantage of adopting Early Preventive and Prophylactic Measures. —*Indian Med Gaz* 1939 June. Vol 74 No 6. pp 347-348

Plague was prevalent from December to the following February in the area for the first time. As the area was densely populated, rats fairly numerous and the camps overcrowded, it might have been expected that an epidemic, if it occurred, would be severe. The non-occurrence of such an epidemic may be reasonably ascribed to the vigorous anti plague measures adopted. Only five cases of plague did occur
W F H

BAKHUISHEV (V. P.) & others Observations on the Fate of Fleas dwelling in the Nests of Ground Squirrels situated in the Regions that had been subjected to Entire Poisoning—*Rev Microbiol Epidemiol et Parasit* Saratov 1937 Vol 16 No 3-4 pp 467-474 [In Russian] English summary [Summarized in *Rev Applied Entom* Ser B 1939 Aug Vol. 27 Pt. 8. pp 170-171]

An account is given of investigations in 1935 and 1936 in 8 districts of the province of Ordzhonikidze (northern Caucasus) to determine whether fumigation of the burrows of ground squirrels [*Citellus pygmaeus*] with chloropacrin or calcium cyanide also destroys the fleas in them. The work was done in spring in localities in which all the burrows had been fumigated for two or three consecutive years to ascertain the presence of fleas, the entrances of the burrows were opened and wads of cotton-wool were inserted into them and examined 24 hours later. Fleas occurred on 44 wads out of 4 474 inserted in the morning (0.9 per cent) and on 20 wads out of 3,182 inserted in the evening (0.62 per cent). It was shown, however by examining nests from treated and untreated burrows that the numbers of fleas were reduced by fumigation. The average numbers per nest were 15.7 in fumigated burrows that still retained the straw plug and were covered with earth, 31.3 in fumigated burrows that had been opened for some time and may have been used by various small animals, and 49 in the untreated inhabited burrows.

Fleas collected from the ground squirrels belonged to 14 different species, the abundance and local distribution of which are shown in a table. They included *Ceratophyllus (Oropsylla) slovakii* Wagn and Ioff, which had not previously been recorded from the northern Caucasus.

- TIFLOV (V E) & POTAPOV (V D) Migrations of Fleas of Ground Squirrels *Citellus pygmaeus* Pall.—*Rev Microbiol Epidemiol et Parasit* Saratov 1937 Vol 16 No 3-4 pp 438-466 With 1 graph & 2 figs [14 refs] [In Russian] English summary [Summarized in *Act Applied Entom* Ser B 1939 Aug Vol. 27 Pt 8 p 170]

In view of the importance in the Russian Union of fleas of rodents in the dissemination of plague and to supplement investigations by other workers field observations on the migration of fleas from abandoned burrows of *Citellus pygmaeus* and on their survival under natural conditions were carried out in Western Kazakhstan from 1st August to 1st December 1934 and from 4th March to 15th November 1935. For this purpose all the ground squirrels over an area of 25 acres were caught and the fleas that tried to leave 50 burrows were trapped. The traps consisted of a metal box containing water which the fleas entered through a tube the end of the tube was inserted into the entrance hole of the burrow. The results which are tabulated showed that all the species of fleas that occur on ground squirrels migrate from abandoned burrows. Species that have well developed eyes and infest the host itself (*Ceratophyllus tesquorum* Wagn and *Frontopsylla semura* Wagn and Ioff) markedly predominated whereas those that have rudimentary eyes and inhabit the nests (*Aecopsylla setosa* Wagn. and *Ctenophthalmus pollex* Wagn and Ioff) were comparatively scarce. In 1934 most of the fleas migrated in August and only two in November. In 1935 the maximum number of fleas was caught in April after which there was a sharp reduction and only one flea was taken in July. After migration had ceased in July 32 burrows were opened and examined for the presence of fleas. 19 live individuals were found, in 7 burrows. A few rodent fleas were caught outside burrows in 1935 and observations on batches of *N. setosa* showed that many could survive on the soil for 24 hours and a few for 48 hours or more.

HAWAII TERRITORY OF ANNUAL REPORT OF THE BOARD OF HEALTH FOR THE FISCAL YEAR ENDED JUNE 30 1938 (TROTTER (F E) Territorial Commissioner of Public Health) [Plague pp 182-205 With 9 graphs.]

Under the heading Plague this report includes a number of subsidiary reports of administrative type from the health officers sanitary engineers and trappers of the plague service. A very interesting observation is made by the Territorial Commissioner of Public Health. The principal advance made in plague control measures during the year was the discovery on the Island of Hawaii that the rat population could be reduced markedly by the proper application of a poison bait. The standard bait consisted of a piece of banana loaded with phosphorus. Other measures of limited application were the use of (1) calcium cyanide dust (2) carbon bisulphide for exposed burrows and (3) sodium arsenite solution for spraying.

IV F H

LEAGUE OF NATIONS HEALTH ORGANISATION SINGAPORE ANNUAL REPORT FOR 1938 [Plague in Countries and Ports. pp 13-27 With 1 map] EASTERN BUREAU [Disease Incidence With 10 graphs &

Under the head of Plague the subject of disease is treated for both countries and ports. In India the tendency of plague has been

ANCHEZAR (B.) La infección experimental determinada por la Cepa EV de Girard (= *Pasteurella pestis* avirulenta) Su estudio bacteriológico y anatómo-patológico [Bacteriological and Pathological Study of the EV Plague Avirulent Strain.]—*Folia Biol* Buenos Aires 1938 Sept-Oct-Nov-Dec. Nos 90-91-92-93 pp 393-396

Experiments conducted with the EV strain of GIRARD showed that (1) this strain, originally isolated from a case of bubonic plague, corresponded to *P. pestis* in all respects (2) It was avirulent for laboratory animals (3) The inoculation of large doses killed animals by toxæmia (4) The strain had a marked selectiveness for lymph nodes and spleen appeared for a short time in the blood and bone marrow and remained for longer time at the site of inoculation (See also this Bulletin 1939 Vol 36 p 313) W F H

BOMBAY REPORT OF THE HARTKEE INSTITUTE FOR THE YEAR 1937 DORNEY (S S) Director (Plague pp. 29-40 47-48.)

Much of the research work noticed in this report has, naturally already been published in journal form. The Director reviews the main points which have emerged from these researches. Plague vaccines made from broth cultures are more potent when incubated at 27°C than at 37°C but the reverse holds good for agar cultures. Those vaccines which are killed by the application of heat for 15 minutes at 55°C are better than those where phenol or formalin are used. Special interest centres round the testing of the relative values of killed virulent plague vaccines and the same strain used in the avirulent but living state in view of the extensive use of living plague vaccine in other parts of the world. It has been found, however that the living avirulent strains tried have varied greatly in antigenic value from one of high protective value to one devoid of protective power. No measurable differences on the other hand, have been found in the antigenic value of a large number of virulent strains. In a small trial of anti-plague serum in which 124 cases were treated, 69 with serum and 55 controls with intravenous iodine the controls exhibited a mortality of 65 per cent compared with only 27 per cent of the serum-treated.

Continuous observation has been going on for a very long time now in Bombay of the composition of the rodent population. It has been found that this population is changing. When plague was raging in 1907 the rodents responsible for the spread of plague in the city were *Rattus rattus* and *Rattus norvegicus* which formed over 99 per cent. of the population. In 1937 these two species together form only about 70 per cent. and *Gnawomys varius* makes up the remaining 30 per cent. *Gnawomys varius* moreover is highly susceptible to plague infection while the other two species are now highly resistant.

Some biochemical studies on the growth conditions of the plague bacillus have shown that its nutritional requirements are relatively simple and "it shows no dependence on accessory factors for growth." Three strains were used a mixture of 8 amino-acids supplemented with phosphate buffer sodium citrate and magnesium sulphate was experimented with to see which of the amino-acids was indispensable to growth. Proline and phenylalanine were wholly indispensable.

In the absence of cystine only one strain grew. Glycine was nearly but not quite essential for two strains while alanine appeared to be so for one strain.

H F H

BOMBAY REPORT OF THE HAFSINE INSTITUTE FOR THE YEAR 1938
[SOLHEY (S S) Director] [Plague pp 30-41 51-52]

The work carried out during the year on plague is very much on the lines of the previous report for 1937 (above). Perhaps the most interesting investigations are those on standardization and relative value of differently prepared vaccines. The method of statistical assessment of the results used is that for estimating fifty per cent. end points employed by REED and MUEVICH (*Amer J Hyg* 1938 Vol 27 p 493). Thus for example in minimum mouse-protective doses (1) Broth vaccine incubated at 27°C protected with 0.0025 cc. at 37°C with 0.008 cc. (2) agar vaccine incubated at 27°C with 0.0851 cc. and at 37°C with 0.0017 cc. (3) live avirulent broth vaccine at 27°C with 0.0025 cc. and at 37°C with 0.008 cc. (4) live avirulent agar vaccine at 27°C with 0.0085 cc. and at 37°C. with 0.0017 cc. The effect of the mode of killing was also carefully estimated.

H F H

BARRETO (João de Barros) A peste no Brasil nos ultimos 5 anos.
[Plague in Brazil in the Last Five Years]—*Arquivos de Hig*
Rio de Janeiro 1938. Nov Vol. 8. No 2 pp 347-374

Plague has been endemic in Brazil especially in the North East. The people of this region are chiefly occupied with the cultivation of corn, cotton and manioc. In the factories there are plentiful supplies of food for rats and the conditions are conducive to the propagation of fleas. During the period of the quinquennium 1934-1938 there were 1,393 cases of plague—208 in 1934 822 in 1935 314 in 1936 35 in 1937 and 14 up to August 1938. It was a relatively benign type of plague with mortalities of 35 per cent. in 1935 39.5 per cent. in 1936 43 per cent. in 1937 and 46 per cent. in 1938. This compares favourably with the ordinary mortality of 60 to 95 per cent. which attaches to bubonic plague. The rats involved were of domestic type—*norvegicus* *rattus* and *musculus*—while the fleas were of the species *X. cheopis* and *brasilensis*. An active campaign has been pursued against the disease and doctors and other workers have been put through a rapid special course before being detailed for the work. Methods of deratization and immunization have been of the usual description. The vaccines used were killed vaccines (1) 2 cc. of a culture suspension from glycerin agar heated 1 hour at 65°C. and (2) a growth at room temperature of 48 hours on agar of pH 7.4 where the suspension was treated with formalin to give a final concentration of 1:2,000 and heated 1 hour at 50°C. For inoculation purposes a dilution was made to 1,000 million organisms per cc. and 2 inoculations were given at 7 days interval.

IV F H

SILVETTI (Luis M.) Informe sobre una epidemia producida en Santa Ana (Tucumán) denunciada como peste septicaemica. [An Epidemic of Septicaemia Plague in Santa Ana (Tucuman) Argentine.].—*Boi Sanitario* Buenos Aires. 1939 Mar Vol. 3 No 3 pp 131-140

The description given is of an epidemic which on bacteriological report was regarded as plague. The author attempted by exhumation

severely but he thinks that in the natives there is a special resistance of the cutaneous vascular system. Full serological investigation was not possible. In the treatment of typhus in Abyssinia, GIUNTA and D'ICCAZIO (p. 988) give intravenous mercurochrome with ascorbic acid and vitamin B₁, glucose and cardiac stimulants.

THOMPSON (p. 990) describes an outbreak of (probably) louse-borne typhus in a member of the Viceregal bodyguard in India and in contacts. The first infection appears to have been contracted in Kashmir. CLEAVE (p. 990) reports a case positive to *Proteus* OX19 whose infection was contracted in Shanghai.

JORDAN and FLETCHER (p. 990) find that an *impero* cresylic product is lethal to lice if ammonia is added.

DYER (p. 991) shows that there has been a considerable increase in the numbers of cases and distribution of endemic typhus reported in the United States in recent years. Practically all the small rodents examined are susceptible. KEMP (p. 991) shows that in Texas endemic typhus is usually contracted at places of work or in rat infested houses. He considers it to be distinct from Brill's disease which Zinsser has shown to be caused by the classical virus.

LORANDO and PAPANASTASSIOU (p. 991) quote two patients, mother and son, with endemic typhus. The rash in the son was profuse but none occurred in the mother. LORANDO (p. 992) reports double orchitis in a case of endemic typhus. BRUNEAU (p. 992) describes a case of endemic typhus.

ZIA *et al* (p. 992) describe the techniques for culture and staining of murine Rickettsia which were successful in experiments on 42 animals. ASHGSTED and LAWKOWICZ (p. 993) cultivated 8 strains of murine virus from infected rats. Six of these were Rickettsial in appearance and serological properties, the other two were more like *Proteus*. Living and formal-killed Rickettsia produced immunity to murine typhus virus.

Murine typhus virus injected into the peritoneum of white mice produces paralysis and LARGET and DURAND (p. 993) compare it with the neurotropic virus of yellow fever. BRUNEAU (p. 993) found that murine typhus virus did not produce fever when injected into Tonkinese patients suffering from nervous diseases. He concludes that many cases in the natives pass undetected.

VIOLLE (p. 994) succeeded in infecting rats by allowing them to feed on material contaminated with urine from infected rats and human patients.

GROUD and PANTHIER (p. 994) show how the virus of murine typhus gains in virulence for white mice on passage through these animals.

RUIZ CASTAÑEDA (p. 994) describes a mild form of typhus, probably murine endemic in Zacualco. *Proteus* X19 was agglutinated in one case.

IWATA (p. 995) classes the strains found in Manchoukoo as murine intermediate and epidemic and shows how the clinical features correspond with the biological characters.

LÉPINE (p. 995) and FERNANDEZ (p. 996) describe clinical cases of splins.

Tick-borne.—GEAR (p. 996) finds that in South Africa the agglutination of *Proteus* OX19 rises to high titre in louse-borne typhus, that of OXA is irregular. The disease is therefore in the same group as classical European typhus. In guinea-pigs orchitis is rare. He recognizes two forms of tick typhus, one mild with constant primary

sore and contracted from veldt ticks the other severe with occasional lache noire and contracted from dog ticks. In serological reactions morphology and distribution of the Rickettsia South African tick typhus resembles Rocky Mountain and boutonneuse fever. He (p 997) considers that the severe type of tick typhus occurs in older people and is transmitted by adult *Haemaphysalis leachi* from domestic dogs in towns.

Blood from a case of spotted fever reported by FITZPATRICK (p 998) produced fever and orchitis in guineapigs which were later found to be immune to a virulent Rocky Mountain fever strain.

BAUERSFELD (p 998) reports an unusual and fatal case of Rocky Mountain fever apparently contracted in Florida. PHILIP and DIAS (p 998) were unable to transmit the virus of Rocky Mountain fever through various Reduviid bugs.

DE MAGALHÃES (p 998) found the virus of Muías Geraes fever in rabbits opossums ticks and bed bugs. The virus passes through the placenta of Rhesus monkeys but not through shaved skin. It rarely passes an LS filter candle but is cultivable on the chorio-allantoid membrane of fowl embryo.

DE MAGALHÃES (p 999) notes that although clinical diagnosis is enough in typical cases of Muías Geraes fever in mild cases further means must be employed.

Mite-borne.—BRUNEAU and CHAPUIS (p 999) describe a case positive to *Proteus OXA* blood inoculated into the eye of a rabbit gave indocyclitis with keratitis and continued fever the typical tsutsuga mushi reaction.

GLYNNER and SCHROEDER (p 1000) show that 46 Europeans have been infected with the *Proteus OXA* type of fever in a district of New Guinea since 1934. The bush is heavily infested with mites. WIJERAMA (p 1000) reports two cases of *Proteus OXA* type of fever in Ceylon. In the Pescadores KAWAMURA and YAMAMOTO (p 1000) show that 32 cases of *Proteus OXA* type of fever have been investigated.

Vaccination.—In the troops in Morocco LAURENS *et al* (p 1000) found that cases of typhus occurred even among the vaccinated and believe this to be due to the fact that the virulence of the vaccine cannot be maintained constant and that if kept too long it loses its efficiency. They suggest the use of dried excreta of fleas.

GAUD (p 1001) reports satisfactory results from widespread vaccination by the method of Blanc during an epidemic in Morocco. MARIANI (p 1001) shows that in 13 000 vaccinations by the method of Weigl in Ethiopia only a few persons showed severe reactions. A few cases of typhus were seen in the vaccinated but these were usually mild.

ZINSSER *et al* (p 1002) found that animals vaccinated with phenol or formal killed agar culture of Rickettsia were immune to test doses. VEINTENILLAS (p 1002) used Zinsser's formal vaccine and found that it protected human volunteers against infection with 2 000 minimum infective doses. One dose of the vaccine protected against murine virus but 3 or 4 doses did so against classical virus also. It is proposed to use this vaccine on a large scale in Bolivia.

SARKAR (S K) A Case of Typhus Fever.—*Indian Med Ga.* 1939
Apr Vol. 74 No 4 pp 223-224

A case of fever in a European in which the Widal reaction was negative but the Weil-Felix was positive for *Proteus OX2* with a

no effect in typhus. That the condition is due to typhus virus can be proved by a study of the temperature chart immunity and agglutination tests. The older and heavier guineapigs give the most marked reaction which varies according to the resistance of the animal and the origin of the virus—blood, brain, etc. The scrotal reaction may appear whatever the source of the virus, but is most common with that of murine typhus and occurs only rarely with that of historic typhus.

D H

NICOLLE (P) & SIMONS (H) Accélération de la sédimentation des hématies dans le typhus murin expérimental du cobaye. [Acceleration of the Sedimentation of the Red Blood Cells in Experimental Typhus in the Guinea-pig.]—*Bull Soc Path. Exot* 1938 Dec 14 Vol 31 No 10 pp 837-846. With 2 graphs

Fifty guineapigs were infected and the reaction tested and compared with 90 control animals.

Conclusions.—In experimental typhus the acceleration of the rate of sedimentation of the red cells is considerable. It commences early in the illness and reaches its maximum on the 8th day, decreases rapidly from the 9th to the 12th and more slowly from 13th to 24th day. Two months after infection it disappears completely. When animals which have recovered are remuculated with the virus acceleration does not occur again.

It is necessary to exclude bacterial infections as these may also produce the same effects.

D H

LESTOQUARD (F) Lode dans la coloration des Rickettsia. [Iodine in the Staining of Rickettsia.]—*Bull Soc Path. Exot* 1939 May 10 Vol 32 No 5 pp 466-467

This method was first suggested in 1926. Films are fixed in iodized alcohol 98 parts alcohol, 2 parts iodine, for 8 to 10 minutes. Wash in pure alcohol to remove the iodine, then stain with Giemsa's stain. This method has been used by the author in his work on *Rickettsia canis*.

D H

GIROUD (P) & PANTHIER (R) La réaction au lugol sur les cellules parasitées par les rickettsies. [The Reaction to Lugol of Cells containing Rickettsia.]—*Bull Soc Path. Exot* 1939 Jan 11 Vol 32 No 1 pp 14-17

This reaction has been described in trachoma, and the authors tried out the same technique using films made from infected tissues of guineapigs. The Mooser cells in the films did not give any reaction. Some cells gave reactions but these did not contain Rickettsia. It is suggested that the reaction is due to staining of glycogen in the cells by lugol. [Presumably this refers to Lugol's solution.]

D H

COX (Herald R) Use of Yolk Sac of Developing Chick Embryo as Medium for Growing Rickettsias of Rocky Mountain Spotted Fever and Typhus Groups.—*Public Health Rep* 1938 Dec. 23 Vol 53 No 51 pp 2241-2247

Inoculation was made into the embryonic membrane enclosing the yolk mass.

The inoculum was

Rocky Mountain fever virus
Endemic typhus virus
Boutonneuse fever virus
Brazilian spotted fever virus
European typhus

blood of guineapig
testicular washings
blood of guineapig

It was found possible to pass all these viruses in series from egg to egg in many instances the embryo was killed by the infection by the 3rd or 4th day. It was also found that the virulence of the inoculum for guineapigs was increased by passage in this manner. It was from 100 to 1 000 times more infective than the same virus from mammalian tissues and was comparable to the virulence in the tissues of the tick.

D H

FIGOURY (L.) & BERNARD (M.) Existence de *Rickettsia canis* dans le Proche-Orient [Existence of *Rickettsia canis* in the Near East.]—*Bull Soc Path Exot* 1939 Jan 11 Vol 32. No 1 p 19

A number of sick dogs were examined films made from lung puncture were stained but no *R canis* were noted. Forty-six dogs from the local pound were examined similarly and in one 6 months old numerous *Rickettsia* were noted in the mononuclear cells in a film from a lung puncture.

The stained film was sent to MM DONATIKY and LESTOQUARD and they definitely diagnosed the parasite as *R canis*.

This is the first time this parasite has been noted in the Eastern Mediterranean (Beirut)

D H

HERZIG (Anna) Eine neue *Rickettsia* Spezies der Laus, der Erreger einer spontan aufgetretenen epidemischen Erkrankung des Menschen [A New Species of *Rickettsia* of the Louse the Cause of a Spontaneous Epidemic of Fever in Man.]—*Zent f Bakt* I Abt Orig 1939 Mar 30 Vol 143 No 5/6 pp 299-302.

Forty to fifty people in Weigl's laboratory feed voluntarily the normal lice which are bred in large numbers for purposes of preparing anti-typhus vaccine. Approximately 300 000 lice are fed daily.

In April 1938, two of these men developed fever with pains in head and back the fever only lasted 2 or 3 days but was followed by relapse. Later the greater number of the men became ill with the same symptoms and a large percentage of the lice showed *Rickettsia* infection. These organisms were extracellular and resembled *R pediculi*. *Rickettsia* could be seen in the blood of the patients in large numbers. It was possible to reproduce the disease in volunteers by injecting subcutaneously the gut contents of infected lice and also by feeding lice on normal men. The incubation period was about 3 days. The *Rickettsia* can be passaged from louse to louse but soon loses its pathogenicity for man. No infection could be produced in any of the usual experimental animals.

All the characters of this *Rickettsia* remind one of *R weigli* and also of *R quintana* the cause of trench fever. Further experiment will be necessary to decide whether these three *Rickettsia* types are actually one and the same or are only morphologically similar.

The author is inclined to the view that these types are distinct from one another and differ just as do different strains and types of dysentery bacilli which produce different types of clinical dysentery

D H

WERNER (H.) *Neuere Ergebnisse der Fünftagesfieberforschung* [Recent Investigations on Five Day Fever]—*Deut Med Woch* 1939 Feb. 3. Vol 65 No. 5 pp 174-176.

During the years of the Great War there were large epidemics of trench fever also many cases of the disease were missed and classified as simple continued fever slight rheumatism or influenza

At the end of the war the disease disappeared as suddenly as it had come For this reason it was not possible to carry out research on any large scale since the war Yet the disease has been reported from time to time in Poland, Galicia and in Japan In 1938 Professor WEIGL wrote to the author and stated that in 1934 there were 18 cases of clinically typical trench fever among the personnel in his laboratory About 40 persons were used to feed the stock lice and 18 of them developed the fever and the Rickettsia found in the lice were similar to *R. quintana*.

The symptoms of the patients corresponded with those of trench fever seen during the Great War All these people had been previously vaccinated with Weigl anti-typhus vaccine

Inoculation of clean lice was successful and the Rickettsia in the lice were extracellular normal people were infected from these lice. The author refers to the work of OGATA in Japan where cases of five day fever have occurred from time to time and this observer has succeeded in isolating the virus from the blood of patients by intra-testicular inoculation in rabbits—pure cultures have been thus obtained and the disease has been produced in man by inoculation of these cultures In 1927 Werner suggested the use of the virus of trench fever in the treatment of neurosyphilis and it has been so used recently by Ogata in Japan.

D H

DYER (R. E.) Similarity of Australian "Q" Fever and a Disease caused by an Infectious Agent Isolated from Ticks in Montana.—*Public Health Rep* 1939 July 7 Vol. 54 No. 27 pp 1229-1237 With 6 figs. [12 refs.] [Summary appears also in *Bulletin of Hygiene*]

In 1935 DAVIS and COX obtained from *Dermacentor andersoni* a virus (V.) which would pass through Berkefeld N and W filters, which held back bacteria and the viruses of typhus and Rocky Mountain spotted fever The virus survives in and is transmissible by the *Dermacentor* in nymphal and adult stages, if ingested in the larval stage and it survives through the eggs to the larva. It does not produce agglutinins for *Proteus* V strains, nor did it infect *M. musculus*. In guinea pigs it produces fever for 2-8 days after an incubation of 4-6 days there is no scrotal reaction Guinea pigs recovered from Q fever virus were found immune to the new virus of Davis and Cox. *Rickettsia burneti* is found in spleens of mice infected with Q fever

and workers in Australia have found *M. rhesus* guineapigs white mice several native rodents the bandicoot (*Isodon macrourus*) susceptible. In guineapigs *Q* virus produces a febrile reaction for 4-6 days after an incubation ranging between 2 and 18 days again there is no scrotal reaction.

As stated above guineapigs recovered from *A* fever were immune to inoculation with λ virus. Other cross immunity tests were carried out with two strains of typhus fever one endemic and one epidemic with two of Rocky Mountain spotted fever one avirulent strain from Montana and a milder one from Maryland. Figures in the text show that there is no cross immunity between the λ strain and the typhus and spotted fever strains nor between the *A* fever and spotted fever strains but as stated above there is complete cross immunity between λ and *Q* fever strains. Other figures demonstrate the results of agglutination and protection tests with the different sera. Briefly as regards the subject of this article definite protection against λ virus was given by λ serum and *Q* fever serum but none by spotted fever serum. The author sums up the points of similarity and difference as follows —

Epidemiology — *Q* fever has been recognized principally in persons associated with animals which suggests infection from direct contact with infected animal tissues or with animal parasites.

The epidemiology of the Montana infection is unknown but the presence of the virus in ticks suggests that human infections may be found in rural areas.

Clinical — The one recognized human infection with the Montana virus was very similar to the published descriptions of the Australian *Q* fever cases.

Susceptibility of animals — As far as work has been carried out the only point of difference in susceptibility of animals to the two infections is the failure of the American workers to find the monkey susceptible in contrast to the success in infecting this animal in Australia.

Serology in man and animals — Neither disease has been found to produce agglutinins for Proteus λ strains. It should not be forgotten that the opportunity to study this point in human beings in this country has been limited to one case (an accidental infection of a laboratory worker in Montana).

Reactions in guinea pigs — The clinical pictures in guinea pigs, as described in the literature are similar with the exception that the Montana infection has been reported to produce a definite local skin reaction following subcutaneous inoculation while the Australian workers state that no particular local reaction follows subcutaneous inoculation. A comparison of the two strains in this laboratory shows that the *Q* fever strain produces general reactions in guinea pigs which although similar to those produced by the Montana virus are milder. This fact may be explained by the attenuation of the *Q* virus during transit to this country. Rickettsiae have not been observed in guinea pigs with *Q* fever while they are present in abundance in guinea pigs infected with the Montana virus.

Cross immunity tests — These tests are identical, with the exception that epidemic typhus, and, to a lesser extent endemic typhus apparently produce more immunity to *Q* fever than to the Montana virus.

Agglutination of rickettsia — In one well-controlled test the serum from one recovered case of the Montana infection gave results identical with one serum from a recovered case of *Q* fever when tested with a suspension of *Rickettsia burneti* prepared in Australia.

Protection tests — As far as these tests have been tried no immunological difference has been noted between the virus of *Q* fever and that isolated from Montana ticks.

legitimate by analogy with other infective diseases, to consider that this hypovitaminosis may play a considerable part. It is also possible to consider that B hypovitaminosis may be concerned with the vascular and perineural lesions. On these suppositions the authors attempted various combinations of vitamin treatment combined with other methods. They had previously found that mercurochrome and strychnine had proved useful and the treatment now advocated, after an experience of 40 cases, consists of intravenous administration of 2 cc. mercurochrome (1 per cent) daily for 5 or 6 days. Intravenous injections of 25 cgm. ascorbic acid (as Cebion, etc.) twice to four times daily. Administration of 10 mgm. vitamin B₁₂ (Betaxin intramuscularly) twice daily with lumbar puncture if the c.s.f. is under pressure and symptomatic treatment with subcutaneous glucose and ordinary cardiac stimulants.

Protocols of these experiments will be published later but in the meantime the authors state that excellent results have been obtained in this way in Addis Ababa. [See also SCAFFIDI above.] C II

THOMPSON (T O) Fevers of the Typhus Group in Northern India.—*Jl Roy Army Med Corps* 1939 Apr Vol 72, No. 4 pp 267-269

This note refers to an outbreak of fever in the Viceregal bodyguard at Dehra Dun in the hot weather of 1929. There were 7 cases with 4 deaths. The medical attendants attributed the fever to bites of ticks incurred while grazing horses in the neighbourhood. On investigation however it was discovered that the first patient was taken ill 4 days after he had returned from leave at his home in Kashmir State on one of the main trade routes through the hills [see BLEWITT this *Bulletin* 1939 Vol 36 p 481]. He had attended a festival 14 days before he developed fever. 10 to 12 days later 3 contacts developed fever and 3 more 10 days later. One case only was seen by the author. He had very high fever and was critically ill. Body lice were seen crawling away over the bedclothes. The patient died a few hours later. The inference is that the cases were true louse-borne typhus and not tick typhus. D H

CLEAVE (T L.) A Case of Typhus Fever.—*Jl Roy Nav Med Serv* 1939 Jan Vol 25 No 1 pp. 72-73 With 1 chart.

A case of typhus contracted in Shanghai and detected during transit to Hongkong. The Weil-Felix reaction was positive 1/840 for *Proteus OX19*. Two guinea-pigs inoculated with blood taken from the case both developed fever and a second guinea-pig inoculated from these also became infected. This work was carried out in hospital in Hongkong. D H

JORDAN (J H) & FLETCHER (A E.) A Note on Disinfestation with Particular Reference to Typhus.—*Chancs Med Jl* 1938. July Vol 54 No 1 pp 71-72

In a letter to the *Tropical Diseases Bulletin* the authors point out that in experiments it was found that ordinary cresylic acid or refined products such as Lysol, Izal, etc. were only slightly toxic to lice even with the addition of ammonia. An *empure* cresylic product containing

pyridine quinoline and naphthalene however had a lethal effect on lice if ammonia was added. This product was cheaper than the pure product and the mixture with ammonia was useful in bug infestation. They suggest that quinoline might prove worthy of investigation in regard to its use in disinfection. [See this *Bulletin* 1939 Vol. 36 p 472.] C II

DYER (R E) *Les maladies à Rickettsia aux États Unis [Rickettsial Diseases in the United States]*—*Bull Office Internat d'Hyg Publique* 1938 Dec, Vol 30 No 12. pp 2772-2774

Two Rickettsial diseases are endemic in the United States endemic typhus and Rocky Mountain spotted fever. In 1923 only 50 cases of endemic typhus were reported and all of these were in the coast towns of the south-eastern States. Since that date there has been a gradual increase in the numbers reported and it has spread from the towns to the country districts. 1,308 cases were reported in 1934 and in 1937 in Georgia alone more than 1 000 cases were reported. Practically all the small rodents natives of the southern States which have been examined have been proved to be susceptible to the virus. Spotted fever also is now no longer confined to the Rocky Mountains but is also found in the eastern States in Canada British Columbia and in Brazil. D H

KEMP (Hardy A) *Endemic Typhus Fever in Texas. An Epidemiological and Clinical Comparison with Forms of Typhus seen elsewhere.*—*Amer J Trop Med* 1939 Mar Vol 19 No 2. pp 109-129 [18 refs]

In Texas the disease attacks young male adults and in the temperate regions the cases occur in August and September. Most of the cases are in middle-class people who contract the disease not in their homes but at their work in shop or store. On the other hand poor whites contract the disease in rat infested houses.

The clinical description shows that the disease is similar to that met with elsewhere but the author insists that the disease is distinct from Brill's disease which ZINSSER has shown is caused by the classical virus. D H

LORANDO (N) & PAPANASTASSIOU (E) *Typhus endémique murine sans exanthème. [Endemic Typhus without Rash.]*—*Bull Soc Path Exot* 1939 Feb 8 Vol 32. No 2. pp 122-124

Two cases of fever occurred at the same time in the same house a man aged 45 and his mother aged 62. Both cases were typical and gave strong positive Weil-Felix reactions. A virus was isolated from the blood and produced fever and orchitis.

The two cases were similar except that in the older patient no sign of rash could be discovered although careful examination was made daily. In the case of the son the rash was profuse and typical. D H

LORENDO (N) Périorchite chez un malade atteint de typhus murin.
[Periorchitis in a Case of Murine Typhus].—*Bull Soc Path. Exot.*
1939 Jan. 11 Vol. 32. No. 1 pp. 17-18.

A case of fever with profuse typhus rash and Weil-Felix reaction positive for *Proteus OX19* in a dilution of 1/500 Just as the fever ceased on the 20th day a double orchitis developed with pain and tenderness the condition lasted for one week. D H

BRUNEAU (J) Un cas de typhus murin, isolement et identification.
[A Case of Murine Typhus, Isolation and Identification of the Virus].—*Rev Méd Française d'Extrême-Orient* 1938 Aug-Sept Vol. 20 No 7 pp 602-608. With 18 charts.

A case of fever in a European with typical rash and other symptoms. The Weil Felix reaction was positive for *Proteus OX19* Blood was taken during the fever and inoculated into guineapigs these reacted with fever and orchitis. Rickettsia were present in smears made from the inflamed tunica. The virus was passaged for 13 generations in guineapigs monkeys were also infected and when tested later were found to be immune to the viruses of murine typhus and true typhus.

D H

ZIA (Samuel H) LIO (P Y) & PANG (K. H.) Isolation of Typhus Rickettsia from Infected Animals on Zinsser Agar Tissue Media.—*Chinese Med J* 1938 Dec. Vol. 54 No 6. pp. 547-558 With 1 fig

The agar for culture of Rickettsia was prepared according to the directions of Zinsser

Take 150 cc double distilled water with 3.2 gm of sod chlor add

3 per cent. pot. chlor 4 cc.

3 per cent calc chlor 4 cc

1 per cent. mag chlor 4 cc

5 per cent sod bicarb. 4 cc.

0.5 per cent pot ac phos 4 cc.

Add 0.4 gm glucose

Horse or human serum 125 cc., filter

Tyrode double strength 100 cc.

Boil 4 per cent agar To 100 cc. agar add 110 cc of filtered

Tyrode+serum Add 10 cc 0.02 per cent phen red Tube

agar and slope 7.8 pH.

Three strains of murine Rickettsia were used, a Mexican strain, a strain from a local rat and from a local patient Small pieces of tunica, removed aseptically from infected rats, were placed on the surface of the agar tubes and incubated at 37°C Mouse embryo tissue was placed in the culture tubes and then transferred to new tubes of media for subcultures.

Smears were examined by staining as follows —

3 minutes phosphate buffer wash off.

4 minutes 0.25 per cent basic fuchsin in distilled water

Decolorize in 0.05 per cent citric acid.

Counterstain 5 secs with 0.25 per cent. aqueous methylene blue

Successful cultures were obtained from 38 guineapigs and 6 rats and subcultures were carried for several generations D H

ANIGSTEIN (Ludwik) & LAWKOWICZ (W) Researches on Strains of *Rickettsia* and *Proteus* cultivated from Experimental Typhus of the Murine Type.—*Trans Roy Soc Trop Med & Hyg* 1939 Feb 28 Vol. 32 No 5 pp 605-613 With 3 figs on 1 plate

The culture medium employed in this research was Noguchi's semi-solid agar medium [see LAWKOWICZ below] Two strains of murine typhus virus were employed one obtained from Tunis and the other from Poland. Tests showed that these two strains were identical. The inoculum was the blood and brain of infected rats and guineapigs. The cultures were incubated at 35°C for 5 days—8 strains were cultivated *in vitro* from these two strains growth appeared after 4 days incubation and consisted of masses of minute cocci or delicate rods. Six of these strains were definitely Rickettsial in appearance were non motile did not ferment any sugars and later grew well on chocolate agar. Two strains were definite bacilli more like *Proteus* these were motile and fermented carbohydrates with the production of acid and gas they were non indologenic. The 6 Rickettsia strains were agglutinated by immune rabbit serum to the same dilution the *Proteus* strains were not so agglutinated. Guineapigs infected by injection of living Rickettsial cultures were later shown to be immune to the virus of murine typhus from passage animals. Formal killed Rickettsial cultures were used to vaccinate rats and immunity was produced against murine typhus virus.

D H

LAIGRET (Jean) & DURAND (Roger) Modification de l'activité pathogène de deux souches de virus typhiques murins entretenues par passages sur les souris blanches [Modification of the Pathogenic Activity of 2 Strains of Murine Typhus Virus during Passage in White Mice.]—*C R Acad Sci* 1939 Feb 27 Vol 208 No 9 pp 673-675

It has already been noted that the virus becomes much less virulent for guineapigs when passaged in white mice. But in the course of their investigation the authors found that if the peritoneal route is employed in the injection of the white mice paralysis is produced and these animals die. This condition is not produced either in rats or guineapigs by the passaged virus although in one or two rats high fever was produced. It was found that in most cases there was a large amount of virus in the brains of the paralyzed mice. This condition is compared with the neurotropic virus in mice in yellow fever.

D H

BRUNEAU (J) Contribution à l'étude expérimentale du typhus murin chez l'indigène tonkinois [A Contribution to the Experimental Study of Murine Typhus in the Natives of Tonking.]—*Rev Méd Française d'Extrême-Orient* 1938 Aug-Sept Vol. 20 No 7 pp 889-901 With 22 charts.

Three strains of virus were used in these experiments one isolated from the brains of rats in Hanoi one from a case of fever in Hanoi and the virus Tunis No 1 sent from Morocco. These viruses were inoculated into Tonkingese suffering from nervous diseases and it was found that these people were not susceptible or only slightly so. Indeed unless the temperature had been taken at frequent intervals

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Successful cultures were obtained from 36 guineapigs and 6 rats and subcultures were carried for several generations D H

ANIGSTEIN (Ludwik) & LAWKOWICZ (W) Researches on Strains of *Rickettsia* and *Proteus* cultivated from Experimental Typhus of the Murine Type—*Trans Roy Soc Trop Med & Hyg* 1939 Feb 28 Vol 32. No 5 pp 605-613 With 3 figs on 1 plate

The culture medium employed in this research was Noguchi's semi-solid agar medium [see LAWKOWICZ below] Two strains of murine typhus virus were employed one obtained from Tunis and the other from Poland. Tests showed that these two strains were identical. The inoculum was the blood and brain of infected rats and guinea-pigs. The cultures were incubated at 35°C for 5 days—8 strains were cultivated *in vitro* from these two strains growth appeared after 4 days incubation and consisted of masses of minute cocci or delicate rods. Six of these strains were definitely Rickettsial in appearance were non-motile did not ferment any sugars and later grew well on chocolate agar. Two strains were definite bacilli more like *Proteus* these were motile and fermented carbohydrates with the production of acid and gas they were non-indologenic. The 6 Rickettsia strains were agglutinated by immune rabbit serum to the same dilution the *Proteus* strains were not so agglutinated. Guinea-pigs infected by injection of living Rickettsial cultures were later shown to be immune to the virus of murine typhus from passage animals. Formol killed Rickettsial cultures were used to vaccinate rats and immunity was produced against murine typhus virus

D H

LAIGRET (Jean) & DURAND (Roger) Modification de l'activité pathogène de deux souches de virus typhiques murins entretenues par passages sur les souris blanches. [Modification of the Pathogenic Activity of 2 Strains of Murine Typhus Virus during Passage in White Mice]—*C R Acad Sci* 1939 Feb 27 Vol. 208 No 9 pp 673-675

It has already been noted that the virus becomes much less virulent for guinea-pigs when passaged in white mice. But in the course of their investigation the authors found that if the peritoneal route is employed in the injection of the white mice paralysis is produced and these animals die. This condition is not produced either in rats or guinea-pigs by the passaged virus although in one or two rats high fever was produced. It was found that in most cases there was a large amount of virus in the brains of the paralysed mice. This condition is compared with the neurotropic virus in mice in yellow fever

D H

BRUNEAU (J) Contribution à l'étude expérimentale du typhus murin chez l'indigène tonkinois [A Contribution to the Experimental Study of Murine Typhus in the Natives of Tonking]—*Rev Méd Française d'Extrême-Orient* 1933 Aug-Sept Vol. 20 No 7 pp 889-901 With 22 charts.

Three strains of virus were used in these experiments one isolated from the brains of rats in Hanoi one from a case of fever in Hanoi and the virus Tunis No 1 sent from Morocco. These viruses were inoculated into Tonkinese suffering from nervous diseases and it was found that these people were not susceptible or only slightly so. Indeed unless the temperature had been taken at frequent intervals

no fever would have been detected and there were no symptoms of ill health. The viruses were of no use as producers of fever for treatment. The local viruses gave rise to less reaction than did the Tunis virus. The Weil-Felix reaction was positive in the cases and one inapparent case reacted to a dilution of 1/700. The conclusion is that many cases in the natives may pass undetected. D H

WU (Chao-Jen) & ZIA (Samuel H.) Isolation of Murine Typhus Rickettsia from House Rats in Peking—*Chinese Med J* 1939 Mar Vol 55 No 3 pp 231-238 With 1 chart

VIOLLE (H.) Expériences sur le virus érythémateux murin. Sensibilité du rat aux urines virulentes d'origine humaine et murine [Experiments with Murine Typhus Virus. The Susceptibility of the Rat to Infected Urine of Man and Rats.]—*C R Soc Biol* 1938 Vol 129 No. 33 pp 864-868.

The author considers that rats were to be preferred to guinea-pigs for these experiments as they are more susceptible and are natural hosts of the virus.

Rats were fed on bread which had been soaked in the urine of rats infected with typhus and these animals became infected. Positive results were also obtained with food contaminated with the urine of a human patient suffering from endemic typhus. The usual symptoms were observed in the infected rats.

This is a possible mode of infection from rat to rat in nature and man may also be infected by the consumption of food soaked by the urine of rats. It is also suggested that the diagnosis of cases might be aided by the feeding of rats on food contaminated with the urine of patients. [See also this *Bulletin* 1938 Vol 35 p 782.] D H

GIROUD (P) & PANTHIER (R.) Comportement de la souris blanche à la suite de l'inoculation de virus typhique murin. [Behaviour of White Mice following inoculation of the Murine Typhus Virus.]—*Bull Soc Path Exot* 1939 Apr 4 Vol 32 No 4 pp 404-409 With 5 figs

If this virus is passed in white mice it gains in virulence for these animals but loses virulence for guinea-pigs. If the virus is then passed in guinea-pigs by the method of intraperitoneal injection of tunica washings the virulence is rapidly regained but virulence is lost for white mice.

The Zimmer virus causes death in 80 per cent of inoculated white mice in from 4 to 23 days. At the first passage death occurs from the 6th to the 14th day at the 2nd passage 4th to 5th day and 3rd passage in 32 to 100 hours. After the 4th passage convulsions occur in the mice lasting about 15 seconds and death follows.

Rickettsia-like bodies were seen in the peritoneal exudate and also in the liver and spleen of the mice. D H

RUIZ CASTAÑEDA (M.) El tifo de Zacoalco [Typhus in Zacoalco.]—*Medicina Mexico* 1939 Aug. 10 Vol 19 No 345 pp 301-303 French summary (7 lines)

The author describes a mild form of typhus which is common in Zacoalco, Jalisco and which had been considered clinically as a form

of typhoid fever. The fever is continuous for 10-12 days without rash. Blood from one of the patients was sent to Guadalajara and there found to agglutinate *Proteus* $\lambda 19$ and *Rickettsia prowazekii* and to give the Neill Mooser reaction in rats. Guinea-pigs immune to the strain L were immune to emulsions of the tunica of animals infected with the Zacualco strain and complete cross immunity was observed.

This strain therefore corresponds to the Mexican orchitic strain of exanthematic typhus probably of murine origin. No body lice were found in the neighbourhood but *P. capitis* was present. It is possible that transmission may occur from man to man through lice but the origin of the infection from rodents and their ectoparasites cannot be excluded. Investigation into its existence in rodents has not been undertaken. C H

IWATA (Shigeru) Study on Typhus Fever Of Types Varieties and Clinical Symptoms of Typhus Fever in Manchuria.—*Jl Oriental Med* 1939 May Vol 30 No 5 pp 183-220 With 1 map [61 refs]

The authors have examined a large number of strains of typhus virus isolated from cases in Manchoukuo. As a result of the effects of inoculation of these viruses into male guinea-pigs they found that they fall into 3 classes. The clinical picture as seen in the Table below corresponds with the laboratory findings.—

Virus

	Class I Murine	Class II Intermediate	Class III Epidemic
Scrotal reaction	Constant	Occasional	Absent
Mooser cells	Constant	Occasional	Absent

Clinical features

Fever	Mild	More severe	Severe and critical
Mental symptoms	None	Occasional	Delirium
Rash	Macular	Petechial	Petechial
Fatal cases	None	Few	Many

In one epidemic all three types of virus were isolated from cases of fever. D H

LÉPINE (P) A propos du typhus sans exanthème [Typhus Fever without Rash].—*Bull Soc Path Exot* 1939 Feb 8 Vol 32. No 2. pp 124-125

A mild case of fever lasting 8 days. The Weil-Felix reaction was positive in a dilution of 1/1600. Blood was taken from the patient and inoculated into a guinea-pig: there was no orchitis but *Rickettsia* were found in smears from the exudate. This case occurred along with other cases which were typical and which all showed a rash. D H

FERNANDO (Cyril F) Tropical Typhus.—*Jl. Ceylon Branch Brit. Med. Assoc.* 1938. Nov. Vol. 35 No. 6. pp 463-466. With 1 chart.

Two cases of fever with rash. The Weil-Felix reaction was strongly positive for *Proteus OX19* in one case in a dilution of 1/5000. It was negative for *OXK*.

Guinea-pig inoculation was positive but *Rickettsia* could not be found in smear from the swollen tunica. D H

JULLIARD (J) & HENAFF. Troubles du métabolisme hydrochloruré au cours des typhus épidémiques et murins. Chloropexie vasculaire et système réticulo-endothélial. Considérations générales. [Disturbances of Chloride Metabolism in Epidemic and Murine Typhus].—*Rev. Service Santé Milit.* 1939. Feb. Vol. 110 No. 2. pp 197-206. With 10 charts. [Refs in footnotes.]

GEAR (J H S) South African Typhus.—*South African Jl. Med. Sci.* 1938. Oct. Vol. 3 No. 4. pp 134-160. With 10 figs. [26 refs.]

A general review of the subject in the light of recent work by the author and his colleagues. PIERCE and others as the result of research were inclined to the view that the viruses of typhus fever in South Africa differed from the viruses of similar diseases elsewhere. [See this *Bulletin* 1931 Vol. 28 p 101. 1932, Vol. 29 p 452, 779. 1933 Vol. 30 p 908. 1935 Vol. 32, p. 154, 168, 561.] For instance they found in the case of louse-borne typhus that the sera gave positive reactions only in low dilutions with *Proteus OX19* and also agglutinated *OX2* in similar or in some cases, higher dilutions. For endemic typhus similar serological results were obtained. Tick bite fever as observed by the same observers was noted as being the mildest of the typhus-like fevers with a constant primary sore or ulcer and was proved to be carried by larval ticks from veldt rodents to man. On the other hand RHOODES [this *Bulletin* 1935 Vol. 32, p 561] in his area of South Africa found that the Weil-Felix reaction in louse-borne typhus was positive, in some in high dilution up to 1/20 000 and in endemic typhus up to 1/4000.

Gear and his colleagues have examined a considerable number of cases of louse-borne typhus (as he says "beyond question one of the major problems confronting the health authorities of South Africa") and his serological findings are summarized as follows—

1 Agglutinins appear early and, before the end of the first week of illness, the titre has reached diagnostic levels. the maximum titre is reached at the end of the fever and is usually high, 1/12,000 to 1/25 000 are frequently observed.

2 *Proteus OX19* is generally agglutinated to higher titre than *Proteus OX2*. The agglutination of *OXK* is irregular and rarely occurs in high dilutions of serum. Louse borne typhus therefore falls serologically into the same group as classical European typhus.

As regards the effects of the virus on experimental animals it is noted that pneumonic changes in the lungs of guinea-pigs were frequently observed. *Rickettsia* were seen in the exudate from the spleen and orchitis although observed was very rare.

Only one case of murine typhus was investigated. this was an accidental infection in the laboratory the writer himself and has

already been reported in this *Bulletin* 1938 Vol 35 p 787. The virus was isolated from the blood and passaged in guineapigs. Orchitis was noted in over 90 per cent of the animals inoculated.

The author then refers to the classical type of tick bite fever as previously described by PIPPER and others. This is a very mild fever with constant primary sore and is carried by larval ticks and is contracted on the open veldt. The author however has noted recently in the city and suburbs of Johannesburg another type of the same disease which differs from the above description in several particulars. The fever is severe with delirium and on at least two occasions proved fatal. The primary sore is not constantly present but when found is a typical *tache noire* with lymphadenitis. This sore has been observed to occur in the conjunctiva. The disease is carried by the dog tick from the dog to its owner and in these particulars closely resembles *boutonneuse* fever of North Africa. Gear is of opinion that these are two types of the same disease the differences being due to the fact that in one case young people are infected by larval ticks (*A. hebraeum*) from veldt rodents in the other type older people are infected by dog ticks (*H. leachi*) from domestic dogs.

The author succeeded in cultivating the virus in egg media and noted that in certain cells the Rickettsia had invaded the nuclei of the cells as do the Rickettsia of Rocky Mountain fever. It was also found that the viruses of louse-borne typhus and endemic typhus are immunologically identical as are the viruses of the two types of tick bite fever. Tick bite fever virus does not protect against the typhus viruses but typhus virus shows some degree of protection against tick bite fever virus.

His conclusions are as follows —

In clinical symptoms serological reactions and course of the disease in experimental animals South African louse-borne typhus resembles the classical disease and the one case of murine typhus examined resembled cases of murine typhus described in other parts of the world.

The South African variety of tick typhus—tick bite fever—resembled other varieties of tick typhus namely Rocky Mountain spotted fever and *fièvre boutonneuse* in the serological reactions and in the morphology and distribution of the Rickettsia. Especially noteworthy were the nuclear infections seen in tissue and egg cultures. The disease is milder in South Africa than elsewhere. D H

GEAR (James) Complications in Tick-Bite Fever. A Survey of Fifty Cases.—*South African Med J* 1939 Jan. 14 Vol. 13 No 1 pp 35-36

Tick bite fever as observed by the author in the Witwatersrand is a severe and on occasions a fatal disease in which the following complications have been met with: general thrombosis, pulmonary embolism, bronchopneumonia, retinal haemorrhages, slight albuminuria in most cases and in one case with previous history of renal disease, uraemia. Severe conjunctivitis was noted in three cases and was due to primary infection in the eye caused by blood from infected ticks removed from dogs.

Three fatal cases were reported and two other fatal cases were investigated. In one the Weil-Felix reaction was positive there was a profuse and typical typhus rash and a definite primary sore was

noted on the head with inflamed glands in the neck in the second fatal case the blood of the patient infected guinea-pigs and a virus was isolated D H

FITZPATRICK (Florence K.) Agar Slant Tissue Cultures of Spotted Fever Rickettsiae.—*Proc Soc Experim Biol & Med* 1938. Dec Vol 39 No 3 pp 501-502 With 1 chart.

A case of spotted fever Eastern type was reported from Cape Cod, Massachusetts. Blood was taken on the 8th day of the illness and injected into two guinea-pigs—one of these developed fever.

The virus was passaged to other animals these reacted with fever and scrotal reaction but no necrosis there was no mortality among the inoculated animals but later these were shown to be immune to a virulent strain of Rocky Mountain fever. The tissues of infected guinea-pigs were cultured on agar slopes and subcultured by means of mouse embryo tissue. There was a very rich growth of Rickettsia and guinea-pigs were infected from the cultures. D H

BAUERFIELD (E Herbert) Rocky Mountain Spotted Fever with Unusual Features.—*Am J Med Assoc* 1939 May 6 Vol 112 No 18 pp 1819-1820

The unusual features in this case were that the rash resembled a typhus rash rather than spotted fever. The rash did not appear till the 9th day instead of the 4th or 5th it was confined to the trunk and was petechial and the patient also developed jaundice which is not usually seen in the Eastern type of spotted fever. There were no other cases in the neighbourhood but the patient's husband had returned from hitch-hiking in Florida 10 days before the illness commenced and she had removed ticks from his person. The patient died. D H

PHILIP (Cornelius B.) & DIAS (Emmanuel) Rocky Mountain Spotted Fever. Failure of Triatomid Bugs to transmit the Virus Experimentally.—*Mem Inst Oswaldo Cruz* 1938 Vol 33 No 4 pp 473-476 [Portuguese version pp 489-472]

The Montana strain of the virus of Rocky Mountain fever was employed in these experiments and bugs of four different genera were tested. Transmission was attempted by feeding on infected guinea-pigs and then feeding on clean guinea-pigs after varying intervals up to 100 days interrupted feeding was also tried and the fed bugs were also ground up and injected.

The result of the experiment shows that these bugs can neither transmit the virus by their bites nor retain virulent virus in their bodies for longer than 2 to 4 days. [See also this *Bulletin* 1938 Vol 35 p 786] D H

DE MAGALHÃES (Octavio) Tifo exantemático em Minas Geraes—O vírus. Algumas propriedades. [Properties of the Virus of Exanthematic Typhus in Minas Geraes].—*Acta Med Rio de Janeiro* 1939 Apr Vol 3 No 4 pp 203-216 With 2 charts. English summary.

On the strength of his own experiments the author concludes that the exanthematic typhus virus of Minas Geraes is of an easy manipulation. It is easy to be isolated from the blood both of human

patients and of inoculated animals when in the febrile period. When they are in the incubation period, their blood as a rule is not infectious or rarely produces transient and benignant disease. There were exceptional cases in which the blood was infectious 24 hours after inoculation. In human blood the author found the virus up to the 18th day of the disease on examining the rare surviving cases. The author encountered the virus, in natural state in wild rabbits (pred opossum ticks (A. cajennense) and bedbugs (C. lectolaris). He states that the spleen is the organ which contains the largest quantity of the virus. In the central nervous system the virus remains a long time up to 60 days when the virus is already not found in the circulating blood and the temperature is low. The virus cooled down to -5 or -10°C has kept its initial virulence up to 160 days after its removal from the animal. When the author operates on the nervous system great care has to be taken because there appear tissue changes giving origin to substances which are toxic to the animals. At ordinary temperature the virus lost quickly (96 hours) the virulence. The author verified the passing of the virus through placenta to Rhesus the fetus of which presented typical changes of the disease. He also verified that the virus does not pass through healthy skin even when shaved, and therefore direct contagion should be very rare. At temperatures above 50°C . the virus dies quickly and at 100° instantaneously. A good medium for the preservation of the virus during some days is glycinated gelatin taking care to avoid its contamination by bacteria or fungi. The action of radium or X rays on the virus is none or nearly none. The virus dried in vacuum is able to be virulent up to 7 days but there are variations in accordance with the sample. The reinoculation of the virus through transmitting arthropods considerably increases its virulence. The virus seldom passes through an L5 filter candle. Employing the current technique it is cultivated very well on the chorio-allantoic membrane of the chick's embryo.

DE MAGALHÃES (Octavio) *Tifo exantemático em Minas Gerais. Diagnostico* (13a comunicação) [Typhus Fever in Minas Gerais. Thirteenth Communication. Diagnosis]—Reprinted from *Acta Medica* Rio de Janeiro 1939 Jan Vol 3 No 1 13 pp With 1 chart English summary (8 lines)

Diagnosis of typhus fever is based on (1) Clinical signs and symptoms (2) Epidemiological state (3) Laboratory tests (4) Pathological anatomical findings (5) Isolation of virus and inoculation into a susceptible animal. Considering the question generally the author concludes that in severe and typical cases clinical evidence is enough but in mild abortive or hyperacute cases (*Typhus siderans*) such evidence is not satisfactory and there is need of one or more of the other investigations noted.

COOLEY (R. A.) *The Genera Dermacentor and Otocentor (Ixodidae) in the United States, with Studies in Variation.*—*National Inst Health Bull* No 171 Washington 1938 Dec. pp v+89 With 30 plates (9 coloured) & 8 figs. [Bibliography] 1938. Washington Govt. Printing Office [\$1 25]

BRUNEAU & CHAPUIS *Observation et étude expérimentale d'un cas de tsutsugamushi à Hanoï. [Observation and Experimental Study of a Case of Tsutsugamushi Fever in Hanoi.]—Rev Méd Française d'Extrême-Orient* 1938. Aug-Sept Vol. 20 No 7 pp 907-912. With 7 charts

A severe case of fever lasting 18 days with a typical primary sore in the umbilical region. Two guinea-pigs were inoculated with blood

taken on the 14th day of the fever and both died post-mortem examination showed the usual signs of tsutsugamushi infection. The Weil-Felix reaction of the blood of the patient was positive for *Proteus* OXA 1/1000 but negative for OX19 and OX2. Rabbits inoculated with blood into the anterior chamber of the eye gave the typical reaction of iridocyclitis and keratitis with continued fever D H

GUNTHER (Carl E. M.) & SCHROEDER (A. G.) Further Observations on Endemic Typhus in New Guinea.—*Med J Australia* 1939 May 6. 26th Year Vol 1 No. 18 pp 688-691 With 1 map

In the appendix to this paper the synonym for endemic typhus is "Japanese River Fever"

Two further cases are described in the present paper both in white people in one case which was fatal the Weil-Felix reaction was positive for *Proteus* OXK in a dilution of 1/2500. Since 1934 46 cases have been reported in this district with a mortality of 20 per cent. All the cases were in white people none has so far been reported in natives. The whole district is heavily infested with mites and also with bush rats. With a view to prevention clearing of paths is suggested and removal of mites by bathing if a primary sore is detected excision of the ulcer is recommended. D H

WIJERAMA (E. M.) Notes on Two Cases of Tropical Typhus.—*Jl Ceylon Branch Brit Med. Assoc* 1938 Nov Vol 35 No 6 pp 467-468.

Two cases of fever without rash or primary sore both were dark skinned people one an Indian, the other a Sinhalese. The Weil-Felix reaction was positive in both cases in a dilution of 1/5000 for *Proteus* OXK negative for OX19. A guinea pig inoculated with the blood of one case developed fever and orchitis and Rickettsia were demonstrated in films from the tunica. D H

their men or nearly all had been vaccinated cases of typhus occurred among the vaccinated. Some of these were reactions following the administration of the vaccine (mild attacks of murine typhus) but others were cases of typhus (epidemic) in recently inoculated people. These failures they attribute to two causes (1) that it is impossible to keep the virulence of the vaccine (murine living typhus virus) constant and (2) that the vaccine if kept too long loses its efficacy. It is suggested that the difficulties might be overcome by using as vaccine the virus in the dried excreta of fleas. D H

GAUD La vaccination contre le typhus exanthématique par la méthode de G. Blanc au cours de l'épidémie de 1938 au Maroc [Vaccination against Typhus by the Method of G. Blanc during the Epidemic of 1938 in Morocco]—*Bull. Office International d'Hyg. Publique* 1939, Dec. Vol. 30 No. 12 pp. 2751-2758 With 2 graphs.

The epidemic started in November 1937 and vaccination was commenced in December and approximately 150 000 people were inoculated each month in Casablanca so that by May over one million people had been vaccinated [see *Bull. Inst. d'Hygiène du Maroc* above, p. 883].

Conclusions are that in districts where typhus breaks out and the majority of the people have been vaccinated the epidemic is arrested. In mixed populations where Europeans and natives are living together typhus cases are much more numerous among the natives but if the native population is vaccinated and the Europeans are not then typhus cases are more numerous among the latter also in places where the people have already been vaccinated cases are few whereas in non vaccinated places there are numerous cases and small epidemics. This vaccine has now been tested in Morocco with satisfactory results. [See this *Bulletin* 1937 Vol. 34 p. 486.] D H

MARIANI (G.) Vaccinazioni contro il tifo esantematico eseguite nel 1938 sull'altipiano etiopico con il vaccino Weigl. [Weigl's Vaccine in Prophylaxis of *Typhus exanthematicus* in the Ethiopian Highlands in 1938.]—*Ann. d'Igiene* 1939 May Vol. 49 No. 5 pp. 316-322.

Over 13 000 vaccinations were performed 2 404 of the subjects being military and 10 672 civilians. Three injections were given at 3-day intervals. In the vast majority the reactions were very slight locally in 95 per cent. there was slight redness and swelling with a little pain coming on 6-12 hours after and lasting 2-4 days less marked after the second and third injections. As for general reactions 20-25 per cent. showed a rise of temperature of $\frac{1}{4}$ -1 degree and some headache rarely did the fever exceed 38.5°C. A few cases were seen among the vaccinated and these ran a mild course with one exception in this case death occurred but infection had been acquired before vaccination was begun. Four others were down with the disease before the vaccination was completed that is, they were vaccinated in the incubation period. H H S

ZINSSER (Hans) FITZPATRICK (Florence) & WEI (Hsi) A Study of *Rickettsias* grown on Agar Tissue Cultures.—*Jl Experim Med* 1939 Feb 1 Vol 69 No 2 pp 179-190 With 3 charts [11 refs]

Agar slopes are prepared with double strength Tyrode solution with horse serum. Small pieces of infected tissue were placed on the surface of the agar and profuse growth of *Rickettsia* were obtained both of murine typhus and historical typhus. These *Rickettsia* are readily stained by carbol fuchsin and counterstained with methylene blue—see paper by ZIA, LIU & PANG above p 992

Subcultures were readily obtained by mixing normal mouse embryo tissue with the infected tissues and inoculating new tubes with this.

Inoculations with cultures after 18 months always produced typical reactions in guineapigs and these animals when tested later were immune to passage virus.

Animals inoculated with phenol or formal killed vaccine from agar cultures were also immune to test doses. By this method of culture large amounts of *Rickettsia* of classical typhus can be obtained and vaccines prepared. [See also this *Bulletin* 1939 Vol 33 p 363]

D H

VENTENTILLAS (Fcha) Vaccination against Typhus Fever with the Zinsser-Castaneda Vaccine.—*Jl Immunology* 1939 May Vol 36 No 5 pp 339-348

The vaccine used in this work was an emulsion of formalized *Rickettsia* from irradiated rats (Zinsser's method) the strength of the vaccine was 5 000 million organisms per cc. Doses of vaccine were given at weekly intervals to 12 people. These people were later tested with doses of virus using 25 times the minimum infective dose for a guineapig and estimated as 2 000 minimum infective doses for man. Three of these people showed slight fever only. One dose of the vaccine protected guineapigs against the murine virus but not against the classical virus but 3 or 4 doses of vaccine protected against this virus also.

It is proposed to use this vaccine on a large scale in Bolivia where prevention by sanitary methods is exceedingly difficult.

D H

MALARIA

PRICE'S OF ABSTRACTS IN THIS SECTION

RICE (p 1003) claims to be able to detect differences in virulence between various strains of benign tertian parasites by means of complete tests of liver function.

RUSSELL and MOHAN (p 1004) describe the staining of oöcysts in living mosquitoes.

VAN THIEL *et al* (p 1004) proved by experiment that *A. maculipennis atroparvus* of the Dutch race is definitely zoophilic towards the pig, but that Italian *labranchias* and *clutus* are anthropophilic. The keeping of pigs is therefore only useful against *atroparvus* in the Netherlands.

CORRADETTI (p 1005) details the Anopheles found in different parts of Abyssinia. From extensive dissections IVENGAR (p 1005) found that *A. philippinensis* in the plains of Bengal and *A. minimus* in the foothills are the most important vectors. RUSSELL *et al* (p 1005) record the simultaneous finding of infected *A. subpictus* and *A. vagus* in Madras. In S Travancore MATHEW (p 1005) found most infection in *A. fluviatilis* and less in *A. varuna* and *A. culicifacies*. PINTO (p 1006) gives an account of the damage done in S America by the introduction of *A. gambiae* from Africa and of its breeding habits. DAS GUPTA (p 1006) records abnormal forms of *P. vivax* seen in the blood of an infant 15 hours after birth.

SARROUY and PORTIER (p 1007) report an Arab girl with fatty nephrosis in the aetiology of which they consider that quartan malaria played an important part. MELCHIOR and ÖZKAN (p 1007) discuss malaria in relation to surgery. SOKHEY (p 1008) uses Folin's reagent in a test for plasmoquine in tissues but it cannot be used with urine.

A note is made of a conference of railway malaria inspectors in India (p 1008). A review of the literature on clover in relation to malaria is compiled by ROSEVEARE (p 1008). MANSON (p 1009) discusses the larvicidal action of various Assamese plants. BRYK and DAS CHOWDHURY (p 1009) show that 0.75 per cent of ammonium sulphate prevents mosquito breeding but as a general measure this would be too costly.

HEWITT (p 1009) details a technique for demonstrating avian malaria parasites in tissue sections. He (p 1010) concludes from experiments on birds that merozoites of *P. cathemerium* enter young red cells. When these are few in number multiple infections are common and *vice versa*.

STAUBER (p 1010) found that environmental temperature and period of rest and sleep were effective in modifying the time of segmentation of bird malaria parasites. HUFF (p 1010) shows that the segmentation of malaria parasites in birds is not associated with a rise in body temperature such as occurs in man. The rapid fall in numbers of *P. cathemerium* at the crisis of the initial attack was shown by BOYD (p 1011) to be due to lowered multiplication and increased destruction which are evident after the third or fourth day.

MANWELL and GOLDSTEIN (p 1011) consider that exoerythrocytic schizonts are merozoites accidentally ingested by cells of the reticulo-endothelial system.

RODRIGUES (p 1011) found streptomycin to be efficacious in *P. knowlesi* infections of monkeys. CHOPRA and DAS GUPTA (p 1012) consider that M & B 693 is more effective than atabrin in *P. knowlesi* infections of apes.

C II

RUGE (H) Leberfunktion bei frischer Malaria nebst einigen klinischen Bemerkungen. [Liver Function in Malaria.]—Reprinted from *Ztschr f Klin Med* 1939 Vol. 136 No 3 pp 311-326

The author had at his disposal for a complete test of liver function 47 cases of malaria, including natural and artificial infections with the three varieties of parasite. Estimations of the non-protein nitrogen serum bilirubin as well as the application of the laevulose tolerance test were carried out at the beginning in the middle and the end of

ZINSSER (Hans) FITZPATRICK (Florence) & WEI (Hsi) A Study of *Rickettsias* grown on Agar Tissue Cultures.—*Jl Experim Med* 1939 Feb 1 Vol 69 No 2 pp 179-190 With 3 charts. [11 refs]

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Animals inoculated with phenol or formal killed vaccine from agar cultures were also immune to test doses. By this method of culture large amounts of *Rickettsia* of classical typhus can be obtained and vaccines prepared. [See also this *Bulletin* 1939 Vol. 35 p 363]

D H

VENTEMILLAS (Felix) Vaccination against Typhus Fever with the Zinsser-Castaneda Vaccine.—*Jl Immunology* 1939 May Vol 36 No 5 pp 339-348

The vaccine used in this work was an emulsion of formalinized *Rickettsia* from irradiated rats (Zinsser's method) the strength of the vaccine was 5 000 million organisms per cc. Doses of vaccine were given at weekly intervals to 12 people. These people were later tested with doses of virus using 25 times the minimum infective dose for a guinea pig and estimated as 2 000 minimum infective doses for man. Three of these people showed slight fever only. One dose of the vaccine protected guinea pigs against the murine virus but not against the classical virus but 3 or 4 doses of vaccine protected against this virus also.

It is proposed to use this vaccine on a large scale in Bolivia where prevention by sanitary methods is exceedingly difficult. D H

MALARIA.

PRELIMINARY ABSTRACTS IN THIS SECTION

RICE (p 1003) claims to be able to detect differences in virulence between various strains of benign tertian parasites by means of complete tests of liver function.

RUSSELL and MOHAN (p 1004) describe the staining of oöcytes in living mosquitoes.

VAN THIEL *et al* (p 1004) proved by experiment that *A. maculipennis atroparvus* of the Dutch race is definitely zoophilic towards the pig but that Italian *labrancheus* and *clatus* are anthropophilic. The keeping of pigs is therefore only useful against *atroparvus* in the Netherlands.

CORRADETTI (p 1005) details the *Anopheles* found in different parts of Abyssinia. From extensive dissections IYENGAR (p 1005) found that *A. philippinensis* in the plains of Bengal and *A. minimus* in the foothills, are the most important vectors. RUSSELL *et al* (p 1005) record the simultaneous finding of infected *A. subpictus* and *A. vagus* in Madras. In S Travancore MATHEW (p 1005) found most infection in *A. fluviatilis* and less in *A. varuna* and *A. culicifacies*.

PINTO (p 1006) gives an account of the damage done in S America by the introduction of *A. gambiae* from Africa and of its breeding habits.

DAS GUPTA (p. 1006) records abnormal forms of *P. vivax* seen in the blood of an infant 15 hours after birth.

SARROUY and PORTIER (p 1007) report an Arab girl with fatty nephrosis in the aetiology of which they consider that quartan malaria played an important part. MELCHIOR and ÖZKAN (p 1007) discuss malaria in relation to surgery.

SOKHEY (p 1008) uses Folin's reagent in a test for plasmoquine in tissues but it cannot be used with urine.

A note is made of a conference of railway malaria inspectors in India (p 1008).

A review of the literature on clover in relation to malaria is compiled by ROSEVEARE (p 1008). MANSON (p 1009) discusses the larvicidal action of various Assamese plants.

BRINK and DAS CHOWDHURY (p 1009) show that 0.75 per cent of ammonium sulphate prevents mosquito breeding but as a general measure this would be too costly.

HEWITT (p 1009) details a technique for demonstrating avian malaria parasites in tissue sections. He (p 1010) concludes from experiments on birds that merozoites of *P. cathemerium* enter young red cells. When these are few in number multiple infections are common and *vice versa*.

STAUBER (p 1010) found that environmental temperature and period of rest and sleep were effective in modifying the time of segmentation of bird malaria parasites. HUFF (p 1010) shows that the segmentation of malaria parasites in birds is not associated with a rise in body temperature such as occurs in man. The rapid fall in numbers of *P. cathemerium* at the crisis of the initial attack was shown by BOYD (p 1011) to be due to lowered multiplication and increased destruction which are evident after the third or fourth day.

MANWELL and GOLDSTEIN (p 1011) consider that exoerythrocytic schizonts are merozoites accidentally ingested by cells of the reticulo-endothelial system.

RODHAIN (p 1011) found astreptine to be efficacious in *P. knowlesi* infections of monkeys. CHOPRA and DAS GUPTA (p 1012) consider that M & B 693 is more effective than atabrin in *P. knowlesi* infections of apes.

C W

RUGE (H.) Leberfunktion bei frischer Malaria nebst einigen klinischen Bemerkungen [Liver Function in Malaria.]—Reprinted from *Ztschr f Klin Med* 1939 Vol 138 No 3 pp 311-328

The author had at his disposal for a complete test of liver function 47 cases of malaria including natural and artificial infections with the three varieties of parasite. Estimations of the non-protein nitrogen serum bilirubin as well as the application of the laevulose tolerance test, were carried out at the beginning in the middle and the end of

ZIMMER (Hans) FITZPATRICK (Florence) & WEI (Hsi) A Study of *Rickettsia* grown on Agar Tissue Cultures.—*Jl Experim Med* 1939 Feb 1 Vol 69 No 2 pp 179-190 With 3 charts [11 refs]

Agar slopes are prepared with double strength Tyrode solution with mouse serum. Small pieces of infected tissue were placed on the surface of the agar and profuse growth of *Rickettsia* were obtained both of murine typhus and historical typhus. These *Rickettsia* are readily stained by carbol fuchsin and counterstained with methylene blue. see paper by ZIA LIU & PAGE above, p 992]

Subcultures were readily obtained by mixing normal mouse embryo tissue with the infected tissues and inoculating new tubes with the mixture. Inoculations with cultures after 18 months always produced typical reactions in guinea-pigs and these animals when tested later were immune to passage virus.

Animals inoculated with phenol or formal killed vaccine from agar cultures were also immune to test doses. By this method of cultivation large amounts of *Rickettsia* of classical typhus can be obtained and vaccines prepared. [See also this *Bulletin* 1938 Vol 35 p 96]

D H

VIENTEMILLAS (Felix) Vaccination against Typhus Fever with Zimmer-Castaneda Vaccine.—*Jl Immunology* 1939 M Vol 36 No 5 pp 339-348

The vaccine used in this work was an emulsion of formalin *Rickettsia* from irradiated rats (Zimmer's method) the strength of vaccine was 5 000 million organisms per cc. Doses of vaccine were given at weekly intervals to 12 people. These people were later tested with doses of virus using 25 times the minimum infective dose for a guinea-pig and estimated as 2 000 minimum infective doses per man. Three of these people showed slight fever only. One dose of vaccine protected guinea-pigs against the murine virus but not against the classical virus but 3 or 4 doses of vaccine protected against virus also.

It is proposed to use this vaccine on a large scale in Bolivia where prevention by sanitary methods is exceedingly difficult. D 1

MALARIA

PRECIS OF ABSTRACTS IN THIS SECTION

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RUSSELL and MORAN (p 1004) describe the staining of living mosquitoes.

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margins there was some resemblance to *P. ovale*. The conclusion however was reached that the parasite was an abnormal form of *P. vivax*. An excellent coloured plate illustrates the characters of the parasite
C W Henryon

SARROUY & PORTIER. Néphrose lipoidique et paludisme [Fatty Nephrosis and Malaria].—*Bull et Mém Soc Méd Hôp de Paris* 1939 Apr 3 55th Year 3rd Ser No 11 pp 561-566

This is a detailed description of the case of an Arab girl aged 14 admitted to hospital in Algiers with generalized oedema and bad general condition. A year previously violent daily attacks of fever with shivering were followed by painful swelling of the lower extremities. Thereafter attacks of fever occurred at irregular intervals but the swelling persisted. The general condition was not seriously impaired however and the child lived a normal life until treated. A month before admission the condition was aggravated daily fever occurred with generalized oedema and diarrhoea. The albuminuria varied at different examinations from 4 to 28 grammes per litre. There was abundant urine from 30 to 35 grammes of urea were passed a day. Blood examination revealed the albumin content down to 40 gm per 1000 with inversion of the albumin/globulin ratio increase of total lipoids to 20.4 gm and an increase of cholesterol from 1.70 on admission to 7.50 gm. Neither casts nor blood cells could be found at any time in the centrifuged urine. Blood chlorine remained within normal limits even at times of greatest oedema. Blood urea generally low among vegetarian natives was as high as 0.77 gm per 1000 on admission. Ambard's constant was normal and arterial tension was not high. In the blood were found rosettes of *P. malariae* but no young forms. Malarial treatment followed by an intensive treatment with raw calf's liver effected some improvement. Blood urea fell the oedema diminished and there was an improvement of the cardiac condition. The patient left hospital before thyroid treatment which was to have been tried could be given. The author considers that malaria played an important part in the aetiology of this fatty nephrosis syndrome in which the renal function was unimpaired.

MELCHIOR (Eduard) & ÖZKAN (Adil). Malaria und Chirurgie. [Malaria and Surgery].—*Schweiz Med Woch* 1939 July 15 Vol 69 No 28 pp 640-642

The authors are working in Turkey and in Anatolia from which district their clinic receives cases. malaria plays a very important rôle. They discuss the subject under four headings. Firstly they consider the provocation of malaria by operations and accidental trauma. the differential diagnosis is particularly important when the malarial attack occurs in persons with infected wounds. As the malarial parasites may not be found in the peripheral blood in all cases it may be necessary to fall back in such cases, on a therapeutic diagnosis by administration of quinine. Secondly the confusion of acute appendicitis with an attack of malaria is dealt with and a case illustrating this point is detailed. Thirdly the surgery of the malarial spleen is discussed. the authors consider that the chief indications for splenectomy are torsion and splenic rupture. They do not favour splenectomy in malarial cachexia. Lastly the influence of malarial

cachexia on surgical mortality is dealt with. They find that resection of the large intestine is liable to be followed by death in patients suffering from malarial cachexia, and there was no other discoverable cause of death. They note that tabes and general paralysis are rare, probably causally related to the high incidence of malaria in the districts. On the question of whether the rarity of post-operative thrombosis and embolism in their cases can be ascribed to the same cause they are not prepared to express an opinion.

E. D. W. Greig

BOMBAY. REPORT OF THE HAFKINS INSTITUTE FOR THE YEAR 1937
[SOKHEY (S. S.) Director]—A Colorimetric Test for Plasmoquine
[NANDI & DIKSHIT] p. 44.

If a few drops of Folin's phenol reagent be added to an aqueous acid solution of plasmoquine and the mixture made strongly alkaline with Na_2CO_3 , a blue colour develops increasing to maximum intensity in about half an hour. The test can detect plasmoquine in a dilution of 1 in a million and can be used for quantitative estimations in dilutions up to 1 in 200,000. The test can also be used for the detection and estimation of plasmoquine in tissues if the latter be treated with an excess of NaOH and extracted with ether to get rid of phenolic compounds, the sodium salts of which are very soluble in water but insoluble in ether. The test cannot be used for the detection of plasmoquine in the urine. [See also this *Bulletin* 1939 Vol. 38 p. 580.]

A. W.

KHARGPUR, B. N. RAILWAY. Report of the Proceedings of the Third Annual Conference of the B. N. Railway Malaria Inspectors held on the 21st February 1938.—83 pp. 1938. Calcutta.

Like most reports of conferences this does not lend itself to summary nor is a summary generally necessary. Nearly all important additions to knowledge reported to conferences find their way independently into the scientific press. This report of a conference of Malaria Inspectors of the Bengal Nagpur Railway has an interest all its own. Quite apart from the local interest and importance of the observations recorded which in many instances are very considerable, it reveals a scientific outlook, powers of observation and an enthusiasm possessed by a team of Malaria Inspectors which must rob the arduous daily round of much of the monotony which it would otherwise possess. The subjects discussed include man-made malaria, the yellow fever menace to India, financial aspects of species control, malaria control on railway constructions, resting habits of adult mosquitoes, and anopheline breeding of many of the species of importance in the territory served by the Railway. The discussions on all these subjects were mostly confined to descriptions of personal observations made by contributors—a precedent worth following.

A. W.

ROSEVEARE (G. M.) Clover and Malaria.—Reprinted from *Herbage Reviews* Aberystwyth. 1939 June. Vol. 7 No. 2 pp. 90-93 [19 refs.]

This is a short review of the subject of *Melilotus* and its possible action in prevention of malaria. The idea was strongly advocated by

D HERELLE some 12 years ago but Bruce MAYNE's experiments showing that coumarin has no plasmodicidal value in mosquitoes and that the low prevalence of malaria in clover districts might be equally well explained by the drainage necessary for proper growth of the clover have now exploded the idea. This review though bringing forward nothing new is useful for reference on a subject now almost a matter of history.

H H S

MANSON (D) The Action of Certain Assamese Plants as Larvicides.—
Jl Malaria Inst of India 1939 Mar Vol 2. No 1 pp 85-83

The conclusions of this paper are as follows —

Duranta, *Zanthoxylum*, *Gardenia* and *Tephrosia* are valuable for their larvicidal action and can be used with success in water where there is no high velocity of flow and in ponds and swamps.

These plants all grow in Assam in profusion and can be used as auxiliary larvicides to oil and paris green in suitable situations. *Duranta* is also an excellent shade plant for malarialogenic drains. *Polygonum* is useful as a shade plant for small surface drains. *Tephrosia* may also be included in the same category. *Gardenia* and *Zanthoxylum* while excellent larvicides are not useful for shade planting but only for their larvicidal action. The larvicidal action of acetone dilutions of the seeds of *Tephrosia vogelii* is very marked and is due to Degueline, an isomer of Rotenone.

BRINK (C J H) & DAS CHOWDHURY (D K.) Ammonium Sulphate as a Combined Fertilizer and Mosquito Larvicide {Abstract}—
Jl Malaria Inst of India 1939 Mar Vol 2. No 1 pp 111-112

Experiments have shown that mosquito breeding cannot take place in water that contains 0.75 per cent. or more of ammonium sulphate. Observations were made with *Culex fatigans* and *A. stephensi*. Questions of cost would prohibit attempts to control mosquito breeding with ammonium sulphate in any large irrigation area.

N IV

HEWITT (Redginal) A Staining Technique for Demonstrating Avian Malaria Parasites in Tissue Sections—*Amer Jl Hyg* 1939 May Vol 29 No 3 Sect C. pp 115-117

The technique described consists of fixation in Zenker's fixative containing 5 per cent. of formal the mordanting of the sections in 2.5 per cent. potassium bichromate solution for one-half to one hour and, following a quick wash in distilled water staining for 24 hours with Wolfbach's Giemsa mixture (distilled water 100 cc 0.5 per cent. Na_2HCO_3 [so given in the text ? NaHCO_3] solution 2-4 drops methyl alcohol 3 cc Giemsa stain 2.5 cc). The sections are washed in distilled water coloured lemon yellow with the above bichromate solution differentiated in 70 per cent. alcohol (30 seconds to 2 minutes) and then dehydrated with graded xylol acetone mixtures up to pure xylol and mounted in balsam or cedar oil.

C M Wenyon

HEWITT (Redgmal) Experimental Erythroblastosis in Canaries and its Effect on Infections with *Plasmodium cathemerium*.—*Amer J Hyg* 1939 May Vol 29 No 3 Sect. C. pp 135-148. With 2 figs [15 refs.]

By the administration of phenylhydrazine solution to canaries, either orally on a number of days or intravenously, on one day a rapid destruction of red blood corpuscles is brought about, followed by the appearance in the blood of large numbers of immature red cells. Birds with this experimental erythroblastosis were inoculated with *Plasmodium cathemerium* and the resulting infection was compared with that produced in normal canaries. It was noted that in normal birds few young red cells are present while the number of cells with multiple infections is great at the start. The cells with three or more organisms are destroyed during their growth, only those cells with one or two organisms surviving. In the phenylhydrazine-treated birds there are many young red cells and in consequence only few with multiple infections. There is thus less parasite destruction and a more rapid rise in the parasite number which reached a higher peak than in the normal birds. The argument is that the merozoites enter young red cells. When these are few in number multiple infections are common, whereas when they are plentiful multiple infections are rare. [See also this *Bulletin* 1939 Vol 36 p 585]

C M H

STAUBER (Leake A) Factors Influencing the Asexual Periodicity of Avian Malaria.—*J Parasitology* 1939 Apr Vol 25 No. 2 pp. 95-118 With 7 figs [31 refs.]

Working with strains of bird malaria parasites which showed some regularity in the synchronism of reproduction, attempts were made to modify the time of segmentation by changes in temperature, light, feeding, host activity and rest and it was found that the environmental temperature and the period of rest and sleep were effective. Light acted only through the eye in that it rendered the host active. The young trophozoites were the forms of parasite chiefly influenced and it was the effect of the changes on them which determined the change in the time of subsequent schizogony. As there is a marked difference in the temperature of the active and the resting canary it seems that this temperature change which occurs when the bird passes from a condition of rest to one of activity or *vice versa* or some physiological condition which underlies it is the factor which determines the actual synchronism.

C M H

HUFF (Clay G) Relations between Malarial Infections and Body Temperatures in Canaries.—*Amer J Hyg* 1939 May Vol 29 No. 3 Sect. C pp 149-154 With 1 fig [11 refs.]

Though considerable fluctuations in the temperature of birds occur normally a notable feature being a rapid rise of temperature on awakening it was not possible to show that the presence of reproducing malarial parasites influenced the temperature. Four strains of parasite were tested in canaries but there was a complete absence of paroxysmal temperature rises at the time of segmentation of the

parasites This is in striking contrast to what obtains in man and mammals generally where the segmentation of malarial parasites is associated with marked rises in temperature C M II

BOYD (George H) A Study of the Rate of Reproduction in the Avian Malaria Parasite, *Plasmodium cathemerium*.—*Amer Jl Hyg* 1939 May Vol 29 No 3 Sect C pp 119-129 With 3 figs [11 refs.]

Working with *Plasmodium cathemerium* infections in canaries the author has observed that the largest groups of merozoites are formed by schizonts during the early stages of an infection The early schizonts produce on an average about 16 merozoites but the size of the schizonts diminishes till by the fourth day only about 12 merozoites are produced There is a slight increase on the seventh day but the original number of 16 merozoites is not again reached. Parasite destruction is low at the commencement of an infection but on the third day may involve 90 per cent of the parasites produced This level of destruction was maintained throughout the period of observation Thus the rapid fall in numbers of parasites at the crisis of the initial attack is due to the combined effect of lowered multiplication rate and increased destruction C M IV

MANWELL (Reginald D) & GOLDSTEIN (Frederick) Exoerythrocytic Stages in the Asexual Cycle of *Plasmodium circumflexum*.—*Amer Jl Trop Med* 1939 May Vol 19 No 3 pp 279-295 With 3 plates. [17 refs.]

The paper describes the presence of exoerythrocytic schizonts in the case of *P. circumflexum* infections in canaries This brings to five the number of species of bird malarial parasite in which these forms have been found the others being *P. cathemerium*, *P. praecox* (relictum), *P. elongatum* and *P. gallinaceum* all except the last named being inoculable to canaries The authors express the opinion that the occurrence of these schizonts is accidental and is due to the chance ingestion of merozoites by the cells of the reticulo-endothelial system. The same merozoites if they had entered red blood corpuscles would have developed into ordinary pigmented schizonts. It is thus the host cell which determines the size of the schizont and the number of merozoites produced. C M IV

RODHAIN (J) Paraaminophenylsulfamide et plasmodium des singes [*p*-Aminobenzinesulphonamide and Monkey Plasmodium].—*Ann Soc Belge de Méd Trop* 1938. June 30 Vol. 18 No 2. pp 255-258

During the treatment of two chimpanzees for a bronchitic infection with streptine (*p*-aminobenzinesulphonamide) it was observed that a simultaneous infection with malarial parasites of the *P. falciparum* type (*P. reichenowi*) was eradicated. This chance observation led the author to test the action of the drug on *P. knowlesi* infections in rhesus monkeys It was found to be equally efficacious in its action against this parasite though not so active as atebm. C M IV

CHOPRA (R. N.) & DAS GUPTA (B. M.) M. & B. 683 (2-Sulphanilyl-aminopyridine) in Ape Malaria.—*Indian Med. Gaz.* 1939 Apr Vol. 74 No. 4 pp. 201-202.

The conclusion reached by the authors is that M. & B. 683 unlike protosol and solnaeptasme is capable of curing monkeys of a *Plasmodium knowlesi* infection, as judged by the failure to relapse (examination of thick films) after a five-day course. The drug was administered intramuscularly in oily suspension, the daily dose varying from 0.05 gm. to 0.15 gm. It appears to be superior to atabrin for this infection for though there is a marked immediate action with atabrin, relapse almost invariably occurs in 10 to 15 days with rapid multiplication of parasites and death of the host if further treatment is withheld.

C. M. W.

LEPROSY

PARCels OF ABSTRACTS IN THIS SECTION

LOWE (p. 1013) gives an account of certain leprosy legislation introduced in India at the end of the 19th century. POOTH (p. 1014) gives an account of leprosy in mediaeval West Pomerania.

LOWE and CHATTERJI (p. 1015) studying seasonal variations in clinical and bacteriological activity found this to be increased in the hot season in Calcutta to end abruptly with the onset of the rains.

In a region of the Congo DEGOTTE (p. 1016) found a disease rate of 44.37 per 1 000. This high rate is favoured by deficient sanitation and prolonged contact with cutaneous cases. In Panama beyond the Canal Zone, the rate found by COURTNEY (p. 1016) was 0.26 per 1 000. The disease appears to be familial and he postulates inherited predisposition in addition to prolonged contact.

In New Caledonia KERVIGNANT and BARI (p. 1016) conclude from a recent survey that leprosy is stationary in the natives and diminishing in the Europeans. The improved methods of prophylaxis include 10 agricultural colonies with good social and medical facilities. The outlook is much better than formerly. CELENTO (p. 1017) shows that in Queensland more cases have been detected recently than before owing to legislation giving power to examine suspects and contacts. There was a serious outbreak in Western Australia in 1933-1936 but DAVIS (p. 1017) reports that it is now well under control.

IXVES (p. 1018) reports a hopeful attempt to control leprosy in the British Solomon Islands by means of a colony system with outlying dispensaries, as at Urukoli in Nigeria.

MUIR (p. 1018) considers that leprosy attacks especially primitive people coming into social and industrial contact with more civilized races.

RYRIE (p. 1018) advises a mobile leprosy unit for surveys in Malaya, and points out that compulsory institutionalism is responsible for much of the

BERTRAM

(p. 1019) working with Kedrowsky's bacillus
bovine type of
reduced grafts
patients, &

tuberculosis.

with tuberculoid
to new tuberculoid

lesions. He failed to infect rats with human leprosy material emulsified in a number of different ways. SUZUKI (p 1019) reports increase in numbers of leprosy bacilli after intraperitoneal inoculation of animals.

McKINLEY (p 1020) reviewing the history of attempts at cultivation of the leprosy bacillus considers that up to 1917 the organisms grown could not be regarded as the true leprosy organism. He describes his own technique and SCOTT in comment carries the account further to include the Calcutta experiments and McKinley's own recent work. Suwo and KIN (p 1021) report multiplication of leprosy bacilli in tissue cultures of leprosy nodules. ROUSSEAU and GAUGEAT (p 1021) claim to have cultivated the human leprosy bacillus on Loewenstein's medium. EVANS (p 1021) isolated chromogenic mycobacteria on Clegg's medium which are considered possibly to be leprosy bacilli.

OBERDORFFER (p 1021) repeats his theory that the plant *Collocasia antiquorum* predisposes to leprosy when used as food. LOWE and CHATTERJI (p 1015) were unable to confirm this hypothesis in Calcutta.

RADNA (p 1021) discovered that patients with lepromata may excrete leprosy bacilli in the urine if undergoing treatment (for yaws or syphilis) with novarsenobenzol. He (p 1022) reviews the possible ways by which the bacilli may be eliminated from the body and their importance in transmission. He further (p 1022) as a result of house enquiries made regarding lepers concludes that family contact constitutes the greatest danger and may take place in a number of ways. Hereditary transmission is probably not important [see COURTNEY above]

C IV

LOWE (J) A Curious Chapter of the History of Leprosy in India
the Indian Leprosy Commission of 1890—*Leprosy in India*
1939 July Vol 11 No 3 pp 82-88

In 1887 the Government of India decided that efforts should be made to control leprosy and set about obtaining information as to the number of leprosy institutions there were the numbers of inmates the rules as regards separation of sexes etc. Institutions were few and were mostly temporary halting places for vagrant leper beggars. In order to stamp out the disease the conclusion was reached in 1888 that the sexes would have to be separated and all lepers confined for life. This being of course out of the question the only practicable measure was to give medical and charitable relief in voluntary hospitals and asylums. The following year however the Legislative Department prepared a draft bill for compulsory detention of all vagrant lepers and correspondence on this resulted in the appointing of a Commission to investigate the problem of leprosy in India. This Commission consisted of five members three selected in England by the National Leprosy Fund authorities (this fund was a memorial to Father Damien who had recently died in Hawaii) and the Royal Colleges of Physicians and Surgeons and two by the Government of India. The former three were Dr Beavan N RAKE of Trinidad, Dr G. A. BUCKMASTER and Dr A. A. KANTHACK and the two from India were Surgeon Majors A BARCLAY and S. J. THOMPSON I.M.S. Of the first three only Beavan RAKE had had any experience in leprosy and he was a man with pronounced anti-contagionist views who first cleared the board by ruling out of consideration all cases in an endemic area, on the grounds that such had no evidential value.

The findings of the Committee were (1) That leprosy is neither syphilis nor tuberculosis but has analogies with the latter (2) That leprosy is not transmitted hereditarily and the disease tends to die out because the majority of lepers are sterile (3) That it is contagious and inoculable but is not spread widely in these ways (4) That leprosy is not peculiar to any race or caste, nor does it arise from the use of any particular food, nor by reason of any climatic or telluric conditions (5) That predisposing causes are poverty, bad food, and insanitation and (6) That it arises *de novo* under a combination of circumstances and conditions whose interrelation is not known.

Consequently, the Commission did not recommend segregation either absolute or partial, but advocated voluntary isolation. Their recommendations included (1) Prohibition of lepers as sellers of food or drink or their engaging in such occupations as barbers and washer men (2) Discouragement of concentration of lepers forbidding vagrant lepers to beg, to use public conveyances or to frequent places of public resort (3) Lepers infringing these regulations were to enter asylums to be built near towns.

Thus we have the peculiar state of things that the disease is contagious to an "exceedingly small" degree but voluntary isolation, prohibition of certain trades and occupations, control of movements and establishment of asylums are recommended for dealing with it. The Government of India adopted the report and on it was based the Leper Act of 1897 which was clearly framed with the view of deferring to public opinion that leprosy is contagious and mitigating a public nuisance. It was a permissive Act enforceable by local governments by notification.

H. H. S.

POOTS (Peter) Leprosaria in Mediaeval West Pomerania.—*Internat Jl Leprosy*, Manila, 1939 Apr-June Vol 7 No 2 pp 257-268 With 1 fig

Mediaeval West Pomerania extended from what is now known as the River Ryck near Greifswald to the border of Mecklenburg and included the island of Ruegen. The author speaks of the 13th century onwards and the existence of leprosaria in the towns and countryside of the mainland and on Ruegen. In the earlier days the lepers of a town, excluded from civil and social life, settled outside the city walls and depended for subsistence on charity. Generally they did so well that others joined them till they formed a community and the town council had to provide for their orderly administration. New buildings were erected, usually with a chapel attached and admission depended on payment of a fee but there were funds to pay for the poor. Dr. OBERDORFFER who translated the article from the German studied in Greifswald and knows the district well. He conjectures that the population in the 13th-15th century was not more than 80,000 and nineteen leprosaria are noted and he thinks the incidence was about 5 per mille. In northern Germany states the author it was the custom to dedicate these chapels and leprosaria to St. Juergen (St. George) and wherever he finds a St. Juergen church or village he regards that as evidence of the former existence of a leprosarium. [From records which he has traced of the "leprosaria" becoming transformed into monasteries or almshouses in so short a time as fifty years we can only infer that as elsewhere these houses were not reserved only for lepers but were probably inns for travellers.]

also and that by inference the number of cases in the buildings was not so high as 5 per mille (or 400 interned). The latter figure if correct would lead us to expect at least twice that number in all a 10 per mille incidence clearing up in less than a century. We may call to mind in this connexion Sir W P MACARTHUR's words in his Notes on Old time Leprosy in England and Ireland. The mere label leper hospital attached to an institution is no proof that it ever contained a single leper. The Erse word for oratories he states was translated into Latin as *nosocomia* that is hospitals and on this being rendered into English the gloss leper houses was added so that leper houses became as numerous as oratories.] H H S

BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION *Leprosy, a Key Disease Report for 1938—36 pp With 9 figs & 2 maps London 115 Baker Street W 1*

This report reveals steady progress. It deals with the medical secretary's tour in East Africa and gives summaries of the work in other areas. The Association now employs 18 T. H. lay workers in addition to a few medical men and nurses. A noteworthy feature is the receipt of £8,920 18s 9d from the first wireless appeal. The leprosy exhibition has continued to arouse fresh interest and to obtain increased support wherever it has gone. L Rogers

LOVE (John) *Lecture Notes on Leprosy—56 pp With 14 plates & 2 maps. 1938 New Delhi British Empire Leprosy Relief Association Indian Council, Talkotara Road.*

This booklet consists of lecture notes used by the author in India for addresses. It should be useful to lay workers and beginners.

L. R.

LOWE (John) & CHATTERJI (S N) *Seasonal Variations in Leprosy in Calcutta.—Internal Jl Leprosy Manila 1939 Apr-June Vol 7 No 2. pp 137-148 With 5 figs*

A visit of Dr OBERDÖRFFER to Calcutta led these authors to study the seasonal activity of their cases as shown by clinical signs and bacteriological findings. An analysis of 2 779 cases seen within three years showed the highest numbers between March and October affecting the neuromacular cases but not the lepromatous ones. Clinical activity was greatest in March to September and the proportion showing bacilli rose markedly to a maximum of 23 per cent. in April and May but fell suddenly in June to below 5 per cent. with a yearly average of below 10 per cent. This indicates an increase of the bacilli early in the year followed by increased cellular activity with a sudden June fall in the bacilli and a later one in cellular activity. Neither STEIN's explanation of sudden meteorological changes nor Oberdörffler's coco-yam hypothesis [see below p 1021] explains these facts which appear to be related to increased bacterial activity in the hot season, ending abruptly with the onset of the rains in Calcutta in June. L R

DECOITTE (J) Contribution à l'étude épidémiologique de la lèpre dans la région du Nepoko (Kibali-Ituri) [Epidemiology in the Nepoko Region.]—*Ann Soc Belge de Méd Trop* 1939 Mar 31 Vol 19 No 1 pp. 1-12. With 1 map

This is a study of leprosy in a badly infected area of the Congo with heavy rainfall. An examination of 8,294 of the native population revealed 388 definite and 162 suspected leprosy cases, 44.37 and 19.53 per mille respectively. This very high rate was favoured by deficient sanitation and infections through prolonged contact especially with cutaneous cases. Males were most affected and a large proportion of the cases were neural. L. R.

COURTNEY (Kenneth O) Leprosy in Panama. A Study of Its Origin and Spread.—*Internat J Leprosy* Manila 1939 Jan.-Mar Vol 7 No 1 pp. 29-40. With 10 figs.

This paper records the results of an inquiry into the occurrence of leprosy in the Panama Republic beyond the limits of the Canal Zone. The infection by the early Spanish settlers is referred to and details of the present distribution with family trees illustrating infections are then given for each province. Four main towns supplied 40 per cent of the 109 cases in the Palo Seco Colony and records of the deaths of 120 other cases were found. In addition, 7 active and 13 unconfirmed cases were met with, and the active cases amount to 0.28 per mille of the population. A history of contact infection was traced in 74 per cent of the cases in the colony and among new provincial cases, and those visited in hospitals and in their families totalling approximately 118 in all except one prior contact with leprosy was established. The disease appears to be a familial one and the author regards it as due to an inherited predisposition coupled with prolonged intimate contact with the disease. L. R.

KERVINGANT (M) & BARÉ (J) La lèpre en Nouvelle-Calédonie en 1936 [Leprosy in New Caledonia in 1936.]—*Internat J Leprosy* Manila 1939 Apr.-June Vol 7 No. 2 pp. 175-200. With 14 figs.

After references to previous inquiries into the leprosy position in New Caledonia in 1914 and 1924 the authors report on the present more hopeful outlook due to the adoption of modern methods of prophylaxis. In the course of a detailed description of the present incidence of the disease they point out that among the natives the sexes are nearly equally affected and the nerve cases greatly exceed the cutaneous. European male cases number twice as many as females, but this is only in proportion to the numbers of each in the islands. The recognized native cases in 1936 numbered 953 or 31.9 per mille and the additional suspected cases were 316 or 10.5 per mille. The European confirmed cases numbered 128 5.2 per mille and the suspected ones 15 or 0.5 per mille. The authors come to the conclusion that the indigenous cases are stationary in number but the European ones are diminishing.

Of greater interest is the information given regarding the adoption of improved methods of prophylaxis. In 1924 there was a nominal and ineffective isolation of patients in 64 segregation villages with no proper supervision and no treatment. In 1936 there were 10 leper

agricultural colonies with good hygiene social amenities and a dispensary to supply regular treatment for the contagious cases. The closed uninfected patients are free are treated in their own villages and are examined every three months. A good colony type of sanatorium has also been supplied for the European patients. The outlook is thus much more hopeful.

L. R

BARÉ (J) Le service de la lutte contre la lèpre en Nouvelle-Calédonie [Leprosy Prophylaxis in New Caledonia].—*Ann de Méd et de Pharm Colon* 1939 Jan-Feb-Mar Vol 37 No 1 pp 165-200 With 12 figs.

This article is on similar lines to that above by the same author with HERVINGANT

L. R

CILENTO (Raphael) Leprosy in Queensland.—*Internat Jl Leprosy* Manila 1939 Apr-June Vol 7 No 2. pp 201-208 With 2 figs (1 map)

This brief paper records the present position of the disease in Queensland. A Health Act of 1937 gave new powers to examine suspects and contacts. An inquiry in a northern area revealed a focus of leprosy of 14 clear and 25 suspected cases and every infected family is now being examined every three months for new cases. Between 1925 and 1938 infections have been found in 58 whites and 71 aboriginals and 126 of whom 88 were males and 38 females, have been admitted to the Pearl Island Lazaret. The number of new detections in the five years to 1935 was more than double those found in any of the six previous five-yearly periods owing to the increased number detected in the coloured people. The more active measures should in time prove of benefit.

L. R

DAVIS (A. P.) Leprosy in Western Australia.—*Internat Jl Leprosy* Manila 1939 Apr-June Vol 7 No 2. pp 209-215 With 1 fig

Leprosy is only found in the northern warmer part of the area where an enquiry into its incidence has been carried out during the last two years by Dr Davis. A spot map shows most cases in the northern hot humid Kimberley division and a smaller number in the North West division. In the former 42 cases were found among 4 001 examined and in the latter 2 among 1 690 persons. The disease is said to have been introduced by indentured labour of the pearling industry. The total number of notifications in the West Kimberley division rose from 2-7 in the years 1908 to 1932 to 41-58 in 1933 to 1936. The serious outbreak thus revealed is said to be now well under control and the new notifications fell to 19 in 1937.

L. R

VOGEL (E.) & RIOU (M.) Les maladies épidémiques endémiques et sociales dans les colonies françaises pendant l'année 1937. Lèpre [Leprosy in the French Colonies during 1937].—*Ann de Méd et de Pharm Colon* 1939 Apr Vol 37 Supplement. pp 534-543

This is a further paper giving the number of known leprosy cases in French colonies all over the world, but contains nothing new. In the absence of reliable surveys the numbers are doubtless far below the truth.

L. R

DECOTTE (J) Contribution à l'étude épidémiologique de la lèpre dans la région du Nepoko (Kibali Ituri) [Epidemiology in the Nepoko Region.]—Ann. Soc. Belge de Méd Trop 1939 Mar 31 Vol 19 No 1 pp. 1-12. With 1 map

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COURTNEY (Herbert O) Leprosy in Panama. A Study of its and Spread.—Internat J Leprosy Manila, 1939 Jan Vol 7 No 1 pp. 29-40. With 10 figs.

This paper records the results of an inquiry into the occurrence of leprosy in the Panama Republic beyond the limits of the Canal Zone. The infection by the early Spanish settlers and details of the present distribution with family tree infections are then given for each province. Four main types of infection are described. In the Palo Seco Colony 40 per cent. of the 109 cases in the Palo Seco Colony, the deaths of 120 other cases were found. In addition 13 unconfirmed cases were met with, and the active cases numbered 0.28 per mille of the population. A history of contact was traced in 74 per cent. of the cases in the colony, and in 67 per cent. of the provincial cases and those visited in hospitals amounting to a total of approximately 116 in all except one in which leprosy was established. The disease appears to be endemic and the author regards it as due to an inherited predisposition with prolonged intimate contact with the disease.

HERVIGANY (M) & BURET (J) La lèpre en Nouvelle-Calédonie en 1936 [Leprosy in New Caledonia in 1936.]—Ann. Soc. Belge de Méd Trop 1939 Apr-June Vol 7 No 2 pp. 1-14 figs.

After references to previous inquiries into the disease in New Caledonia in 1914 and 1924 the authors record a more hopeful outlook due to the adoption of prophylaxis. In the course of a detailed description of the incidence of the disease they point out that amboyeses are nearly equally affected and the nerve and cutaneous. European male cases numbered 1.5 per mille, but this is only in proportion to the number of males. The recognized native cases in 1936 numbered 0.5 per mille and the additional suspected cases were 0.5 per mille. The European confirmed cases numbered 1.5 per mille and the suspected ones 1.5 or 0.5 per mille. The conclusion is that the indigenous cases are stable but the European ones are diminishing.

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BERTRAND (Ivan) BABLET (Jean) & BLOCK (Françoise) Sur l'inoculation intracérébrale au lapin de bacilles acido-résistants isolés chez les lépreux. [Intracellular Inoculation of Bacilli from Lepers]—*C R Soc Biol* 1939 Vol 130 No 14 pp. 1565-1566

This is a report on the results of intracerebral inoculation in rabbits with acid fast bacilli obtained from leprosy patients. The strain isolated by CHAUSSINAND at Saigon that of LEVI of HYOGO and UCHIDA in Tokyo and of KEDROWSKY have been used by the technique the authors had previously employed in the case of tubercle and paratubercle bacilli. The first three forms gave negative results but Kedrowsky's bacillus produced similar lesions to those caused by paratubercle bacilli so the authors conclude that this organism is a bovine tubercle bacillus isolated from a leprosy patient infected by both it and the true lepra bacillus. L. R.

- i. TISSEUIL (J) Essai d'inoculation de la lèpre humaine aux lépreux par greffe hétéroplastique dermo-épidermique [Inoculations of Human Leprosy Bacilli into Animals.]—*Bull Soc Path Exot* 1939 Apr 4 Vol 32. No 4 pp 382-385
- ii. — Essais d'inoculation de la lèpre humaine au rat d'élevage. (Première note)—*Ibid* pp 542-545
- iii. — Essais d'inoculation de la lèpre humaine au rat d'élevage. (Deuxième note)—*Ibid* pp 546-553

These papers report further attempts by the author to infect animals with human lepra bacilli. This is a record of further grafting of tuberculoid leprosy infected skin into other infected subjects who are more likely to give positive results than apparently healthy subjects. In two instances at the end of four to six months new tuberculoid leprosy lesions were found. In a third lepra bacilli were still found in the lesions at the edge of the ulcer.

ii. This note records attempts to inoculate human leprosy into bred rats. Emulsions of leprosy material were used, with the addition of biological or chemical substances or other acid fast bacilli. With emulsions the local reaction quickly disappeared. With the addition of other substances reactions of variable strength resulted and in two a second injection after 6 to 8 weeks produced a black slough. The glands were frequently positive for acid fast organisms after four months. No results were obtained by ingestion of the leprosy material, so the results were all negative as far as reproducing human leprosy lesions is concerned.

iii. In this series of experiments the emulsions of leprosy material were made up in broth, beef bile, gelatine, olive oil, glycerine and vaseline respectively as culture media favourable to bacillary growth and other acid fast bacilli were added in some. No definite results were obtained. L. R.

SUZUKI (Rissyun) Ueber die Impfung von Tieren mit Leprabazillen. [Inoculation of Animals with Lepra Bacilli.]—*Tohoku Ji Experim Med* 1939 July 30 Vol. 36. Nos. 2 & 3 pp 146-152. With 3 figs. (2 coloured)

This short paper records that intraperitoneal injection of lepra bacilli resulted in the formation of nodules containing the organisms which are believed to have increased in numbers. L. R.

IANES (James Ross) Report of Leprosy Survey of the British Solomon Islands Protectorate.—70 pp. With 9 maps (3 folding) 1 plan & 1 diagram. 1938 Suva, Fiji.

This is the full report of the inquiry a summary of which was dealt with in this *Bulletin* 1938 Vol 35 p 882. It brings out the laborious nature of the survey and takes a fairly hopeful view of an attempt to control the disease by the colony system with outlying dispensaries, as in use at Uruakoh in Nigeria, while not minimizing the difficulties owing to the bush nature of the most heavily infected island of Malaita.

L. R.

MIR (Ernest) Leprosy in Africa.—*Trans Roy Soc Trop Med & Hyg* 1939 June 29 Vol 33 No. 1 pp 119-126

This address is of a general nature. The author once more considers leprosy to be a disease that especially attacks primitive people on coming into social and industrial communication with more civilized races including changes of diet clothing and manner of life. A table is given of the estimated number of leprosy cases in British African possessions which total 256,000 and is considered to be below the truth. The method of prophylaxis in use in South Africa is a modified form of compulsion and in Nigeria is a free colony system with outlying treatment dispensaries with the sympathetic help of missionaries and T. O. C. H. workers.

L. R.

HASSELMAN (C. M.) Zur Epidemiologie und Sozialhygiene der Lepra, mit besonderer Berücksichtigung der Verhältnisse auf den Philippinen [The Epidemiology of Leprosy as seen in the Philippines].—*Ztschr f Hyg u Infektionskr* 1939 May 10 Vol 121 No 5 pp. 649-662. [18 refs.]

This is a general account of the campaign against leprosy in the Philippines on the lines of many previously extracted papers on the subject it contains nothing new.

L. R.

LAFFERRÈ & ROUAMET. Lepra autochtone bretonne. Maladie de Morvan ou syringomyélie? (A propos de deux observations.) [Indigenous Leprosy in Brittany].—*Bull et Mém Soc Méd. Hôpitaux de Paris*. 1939 June 28 55th Year 3rd Ser No. 21 pp. 968-973

RYER (G. A.) Some Principles for directing Leprosy Surveys.—*Jl Malaya Branch Brit Med Assoc* 1939 Mar Vol. 2. No. 4 pp 233-238

This brief note is largely concerned with the local conditions necessitating patience and tact in Malaya during leprosy surveys. A card is described for recording the observations. The author emphasizes that a great deal can be done by treatment especially in tuberculous leprosy. Attention should be paid to diet in relation to incidence. A leprosy mobile unit is advised for survey propaganda and treatment similar to that long used in India. A large factor in concealment of cases is the "bugbear of compulsory institutionalism." A full list of all known patients should form the basis of the survey.

L. R.

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McKINLEY (Earl B.) The Bacteriology of Leprosy A Review —
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This article is indeed an excellent review of a subject which has presented many difficulties and problems to which many research workers of renown have devoted much time in solving since HANSEN's momentous discovery in 1874. The author considers the subject in a critical manner from the early studies of GAUCHER, THIM STEVEN LUTZ and RAKE, who all attempted cultivation of the organism associated with lepra lesions on the various media known in their day but were unable to obtain confirmatory results by animal inoculation. The author proceeds to describe the measures tried under periods, 1890-97 which includes the work of HANSEN KANTHACK, BARCLAY DUCKEY BYRON ROCCA and UHNA 1897-1900 with the studies of LEVY SPROCK, Czaplewski MAL TEICH SCHOLTZ and KLINGMULLER 1900-1909 mainly dealing with KEDROWSKI's work and that of ROST WEIL and WHERRY who confirmed the pleomorphism of cultures which others had also observed 1909-12 and the Philippine investigators notably CLEGG and the symbiotic cultivation in association with an amoeba, confirmed by CURRIE, BRUCKERHOFF and HOLLMANN and the work of TEAGUE, DUVAL, SERA, BAYON and others 1913-17 the chief investigators of this period being FRASER, FLETCHER, REENSTIERNA, MCCOY and again ROST.

The question at that time may be summed up by saying that none of these organisms had established the claim to be the *true leprosy organism*. The author next considers in fuller detail the claims of Walker's diphtheroid types, the partly acid-fast organisms of Bordoni-Uffreduzzi and others, of de Souza Aranzo of Shiga the rat-leprosy studies and finally his own investigations with Soule. He describes his technique and the animal experiments carried out by himself and his colleague and concludes. There seems to be no good reason to question the status of that organism [Hansen's bacillus] which is so constantly associated with lesions of this disease. Its final cultivation on artificial media will one day be accepted another chapter in the study of this disease will be brought to a close and new vistas of study will be opened.

[It is not possible to abstract this valuable article by Dr McKinley it is itself a review crammed full of interesting points. The following quotation from SCOTT a recently published *History of Tropical Medicine* calls attention to further work on cultivation of the organism of leprosy not included in the article above. He states (p 629)

Throughout 1838 attempts were made at the Calcutta School of Tropical Medicine to confirm the reports of successful cultivation. Twenty four series of experiments were carried out and a thousand tubes of different media inoculated. Of seventy tubes seeded in August and kept in a gaseous environment of 40 per cent. oxygen and 10 per cent. carbon dioxide thirty five showed slight macroscopic and considerable microscopic evidence of colony formation and many masses of acid-fast bacilli were seen in smears. Of another seventy under ordinary atmospheric conditions fourteen showed similar but less evident growth.

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By 1937 McKinley and de Leon reported having earned the cultivation through sixty generations. The most successful medium has proved to be hormone-glycerol-agar.]

SUWO (Masasue) & KIN (Shotai) Ueber kulturen von leprösen gewebe in vitro I Mitteilung Gewebskulturen von haut knötchen bei menschenlepra. [Tissue Culture of Human Leprosy Nodules].—*Internat J Leprosy* Manila. 1939 Jan.-Mar Vol 7 No 1 pp 57-66 With 21 figs. on 4 plates [10 refs.]

Bacillus-containing leprosy tissues have been studied in cultures. It was found that small pieces of leprosy nodules grow well in tissue culture with fibroblasts and epitheloid cells with lepra bacilli in them the latter appear to accumulate in the fibroblasts and lepra cells develop from the epitheloid cells with multiplication of bacilli in them and in the fluid, but without visible colonies of the organisms

L R

ROUSSEAU (Paul) & GAUGEAT (M) II Culture du bacille de Hansen (à partir du sang de lépreux) Technique personnelle [Cultures of Hansen's Bacillus from the Blood of Lepers].—*Rev Méd et Hyg Trop* 1939 Nov.-Dec Vol 30 No 6 pp 326-332.

These workers claim to have cultivated Hansen's bacillus from both leprosy lesions and from the blood of leprosy cases in Loewenstein's media. The organisms were pleomorphic and grew readily on culture media.

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EVANS (Florence L.) Clegg's Amoeba Culture Method for growing *Mycobacterium leprae*.—*Public Health Rep* 1939 Feb 24 Vol 54 No 8 pp 301-305 [11 refs.]

This note reports a trial of Clegg's method of culture in symbiosis with the cholera vibrio or other bacteria and amoebae. Two chromogenic *Mycobacteria* were obtained which are considered to be possibly the causative organism of leprosy.

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OBERDORFFER (M) Introduction to an Investigation of Racial Differences in the Clinical Picture of Leprosy.—*Leprosy Review* 1939 Apr Vol 10 No 2 pp 112-114

This note repeats the hypothesis in a former paper in this Bulletin [1938 Vol. 35 p 882] to the effect that leprosy is predisposed to in the tropics by the use of a food plant called *Collocasia antiquorum* which the author states to contain a highly toxic sapotoxin with a definite seasonal variation.

L R

AYKROYD (W. R.) & KRISHNAN (B. G.) A Diet Survey of Families with Leprosy.—*Indian J Med Res* 1939 Apr Vol. 26 No 4 pp 897-900

RADVA (R) Sur la bacillurie des lépreux [Bacilluria in Leprosy].—*Ann Soc Belge de Méd Trop* 1939 Mar 31 Vol. 19 No. 1 pp 51-53

The elimination of lepra bacilli in the urine has been studied in view of the finding of BERRY that the organisms of rat leprosy are more frequently eliminated in animals undergoing arsenical treatment. Repeated examination of the urine of patients before the administration of arsenic always proved negative but in 9 cases being treated with

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urine in the form of novarsenobenzol for complicating syphilis or lepra, the urine was commonly positive for lepra bacilli in lepromatous, but not in nerve cases. Such cases should therefore be treated in hospitals when possible. L. R.

RADNA (R) Contribution au problème de la transmission de la lèpre Les formes de la lèpre dans la région de Pawa et leur infectiosité Première note l'élimination du bacille de la lèpre. [Transmission of Leprosy The Elimination of the Bacilli.]—*Ann Soc. Belge de Méd. Trop.* 1939 Mar 31 Vol. 19 No. 1 pp 39-50

This inquiry into the modes of transmission of leprosy is in agreement with the general view of the importance of the discharge of lepra bacilli from the nose and skin. Droplet infection in laryngeal cases and the escape of lepra bacilli through the genito-urinary apparatus, in the milk, tears and stools are also considered to be possible means of infection. L. R.

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This is an epidemiological study of the conditions of leprosy infections in a French colony. An attempt was made to discover the sources of infection in 241 cases of leprosy by house inquiries with success in only 132, in 125 of which the transmission occurred in the family. The possibility of hereditary transmission was considered, with the conclusion that although it could not be denied, at the most it could play very little part. Contact infection is then dealt with and the dangers of contamination by dust of rooms and through smoking pipes and cigarettes is pointed out. Infection through bedbugs, flies and other insects is considered to be possible but rare. The general conclusion is that family contact constitutes the greatest danger. L. R.

LEISHMANIASIS

PRELIS OF ABSTRACTS IN THIS SECTION

ZAMBRANO (p. 1024) adds physiological saline or skimmed goats milk to the water of condensation of NNN medium for the cultivation of leishmania. SEXEKI (p. 1024) describes the preparation of a medium more suitable than NNN for the primary isolation of *L. tropica*.

ADLER and THEODOR (p. 1025) studied the development of *L. chagasi* in *P. papatasi* which had been infected by feeding through a membrane upon a suspension of flagellates. Passage of flagellates to the oesophagus may occur as early as 3 days after feeding.

CHUNG and FENG (p. 1025) found flagellates indistinguishable from developing leishmania in *P. chinensis*. They (p. 1025) show that *P. chinensis* is a satisfactory host for the parasite of canine kala azar in Peiping and consider that this fact may throw light on the epidemiology of human disease if the parasites are identical.

GIRAUD *et al* (p 1026) restate the theory that in Marseilles kala azar is primarily a disease of dogs and that it is transmitted to children by the dog tick. SERGENT *et al* (p 1026) also believe that Mediterranean kala azar is mainly a disease of dogs and that transmission is from dog to dog and from dog to child rather than from child to child. They therefore advise control of dogs and prevention of contact but they incriminate sandflies dog ticks not being mentioned

DA CUNHA (p 1027) shows that in the skin of dogs infected with S. American kala azar there are collections of macrophages containing parasites. The skin may otherwise appear to be normal. He considers that this parasite is identical with *L. infantum*

FENG *et al* (p 1027) describe the symptoms in 12 dogs suffering from kala azar in Peiping and Ho (p 1027) notes that there was a child with kala azar associated with one of these dogs.

MENDES (p 1028) records canine kala azar in Lisbon

PAPANTOYAKIS (p 1028) describes the measures taken in Canea to prevent the spread of canine kala azar and its transmission to man. All dogs are carefully examined and the destruction of infected dogs has been followed by reduction in the number of human cases

BLANC (p 1028) found a squirrel dead of leishmania infection in Morocco

MURANO and VECCHIO (p 1029) consider the anaemia of kala azar to be due to alterations in the reticulo-endothelial system brought about by the leishmania

MENON (p 1029) discusses the splenic reaction in kala azar which at first is a reticulo-endotheliosis. DE VRIES (p 1029) regards a positive formol-gel reaction as merely an indication of hyperglobulinaemia.

GREVAL *et al* (p 1030) quote figures to show the value of complement fixation tests with a certain technique using the W.K.K. antigen

NAPIER (p. 1030) though regarding sternal puncture as a valuable aid to diagnosis obtains better results from splenic puncture which in his hands has not proved harmful.

An incubation period of 1-2 years was a feature of a case reported by PALLISTER (p. 1030). Two cases of kala azar from the South of France are reported by OLMER *et al* (p 1030). LEAHY (p 1031) reports kala azar probably contracted in Sicily in a child in the United States. SHAPIRO and BIESH (p 1031) describe a child in Palestine with kala azar and leishmaniasis of the face. DASTIDAR (p 1031) describes post kala azar dermal leishmaniasis in an Indian. Leishmania were found in nodules on the tongue. LINTON (p 1031) describes kala azar in a Lascar seaman in Glasgow. GATTI *et al* (p 1032) describe kala azar in a Paraguayan apparently contracted in Bolivia.

FERRABOUX *et al* (p 1032) describe clinical cases in one of which the early stages were afebrile with consequent delay in diagnosis

ERMEN (p 1032) shows that neostibosan produces histiocyte response and leucocytosis in hamsters but found a leucopenia. WANG (p 1032) found a higher rate of cure in infected hamsters with neostibosan than with solustibosan. Daily injections are less effective with both than bi weekly or tri weekly injections

AVERSA (p 1033) speaks well of solustibosan in infantile kala azar. MIRZOJAN (p. 1033) reports on the value of sourmine (stibosan) in treatment. DAS GUPTA (p 1033) shows that allergic symptoms after intravenous ureastibamine, once common have not often been seen since smaller (but still efficacious) dosage was adopted.

POGGI and MOVITI (p 1033) show that oriental sore is common in the province of Forlì, Italy. VANNI (p 1034) incriminates *P. macdonaldi* as the intermediate host of *L. tropica* in Abruzzi.

JERACE (p 1034) shows that in Teramo (Italy) the distribution of *P. perfoliatus* corresponds with that of cutaneous leishmaniasis. BERBERIAN (p. 1034) has succeeded in effecting further transmissions of oriental sore by allowing *Stomoxys calcitrans* to bite volunteers immediately after feeding on a sore. He (p 1035) succeeded in infecting 35 volunteers with *L. tropica* from cultures and considers this procedure to be useful in conferring immunity.

PELLETTIERI (p 1035) reports oriental sore in a patient from Eritrea. DA CUNHA and DIAS (p. 1035) use an antigen prepared from strains of leishmania isolated from S. American cutaneous leishmaniasis.

PIFANO (p 1035) finds formalin to be the treatment of choice for mucocutaneous leishmaniasis in the Argentine.

WEINMAN (p 1036) describes a technique for the cultivation of *L. tropica* in pieces of guinea pig tissue on the surface of blood or serum-Tyrodé agar. C II

ZAMBRAO (Ebo) *Cultivabilità del parassita di Leishman su terreno NVN con aggiunta di soluzione fisiologica clorodidica* [Cultivability of the Leishmania Parasite on NVN Medium with Added Physiological Saline Solution].—*Giorn. di Bacteriol e Immunol* 1939 June Vol 22 No. 6 pp. 881-890 [10 refs.] English summary (9 lines)

The author shows that leishmania can be successfully cultured and subcultured in NVN medium in which the water of condensation has been replaced or increased by the addition of physiological saline solution. Before inoculation the liquid is allowed to remain in contact with the surface of the blood agar for 24 hours in the incubator at 37°C. Equally good results are obtained by the similar use of skimmed goats milk. C M Wenyon

SENEKJI (H. A.) *Studies on the Culture of Leishmania tropica*—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939 July 23 Vol. 33 No. 2 pp. 267-269

The author has found that ordinary NVN medium does not give very satisfactory results for the primary isolation of *Leishmania tropica* from oriental sores. A better medium is prepared as follows. To 50 grammes of Bacto beef, 1000 cc. of distilled water is added. The mixture is infused for one hour at 60°C. and then heated for five minutes at 80°C. to coagulate some of the protein. After keeping in the ice-chest for 24 hours the mixture is filtered. To the filtrate are then added neopeptone (Difco) 20 grammes, sodium chloride 5 grammes, agar (Nobel) 20 grammes. When solution has taken place by heating, the pH is adjusted to 7.2 to 7.4 and 1.5 cc. amounts are distributed in test tubes and 30 cc. amounts in Blake bottles with screw caps. After the tubes and bottles have been sterilized in the autoclave they are cooled to 55°C., at which temperature defibrinated rabbit blood is added to an amount equal to 15 per cent. of the medium. After gently mixing the contents, the tubes and bottles are sloped. Primary cultures are readily obtained in the water of condensation

of the tubes By inoculating the water of condensation in the bottles with cultures and allowing the water to flood the agar surface cultures are obtained
C M W

ADLER (S) & THEODOR (O) The Behaviour of *Leishmania chagasi* in *Phlebotomus papatasi*—*Ann Trop Med & Parasit* 1939 Mar 31 Vol 33 No 1 pp 45-47

The authors have already described a method for inducing sandflies to feed through a membrane on suspensions of leishmania flagellates. In the case of *Phlebotomus papatasi* the flies feed with reluctance unless the fluid contains red blood corpuscles. If however the membrane is smeared with a solution of cane sugar as many as 80 per cent of the flies will feed. The relative infectivity of different flies can be tested by allowing them to ingest emulsions of known flagellate content. Generally, it is found that the percentage of flies becoming infected increases with the increase in the flagellate content of the emulsion. Thus of flies fed on emulsions of *Leishmania chagasi* containing 300 flagellates per 0.1 cmm. 24 per cent became infected, while of those fed on emulsions containing 1,000-2,000 per 0.1 cmm. 71 per cent were infected while with still higher concentrations the figure was 89 per cent. When an infection has been established in the flies the flagellates multiply in the midgut and ascend to the anterior part of the cardia which may become choked with flagellates. Passage into the oesophagus may occur as early as three days after feeding. In its behaviour in *P. papatasi* *L. chagasi* resembles *L. donovani* and *L. infantum* since both these give a low infection rate in flies fed on emulsions containing 300-400 flagellates per 0.1 cmm. of emulsion
C M W

CHUNG (Huei Lan) & FENG (Lan-Chou) Natural Infection of *Phlebotomus chinensis* in Peiping with *Leishmania* Flagellates.—*Chinese Med J* 1939 July Vol. 56. No 1 pp 47-51
With 1 plate

In the kennel of a dog suffering from canine kala azar and in the house of the owner in Peiping, 16 specimens of *Phlebotomus chinensis* were captured between the 5th and 10th June 1939. Of these flies two were found to be infected with flagellates indistinguishable from developmental forms of leishmania.
C M W

FENG (Lan-Chou) & CHUNG (Huei Lan) The Development of *Leishmania* in Chinese Sandflies fed on Dogs with Canine Leishmaniasis.—*Chinese Med J* 1939 July Vol. 56. No 1 pp. 35-46
With 5 figs. on 2 plates. [12 refs.]

The authors in Peiping N China have fed sandflies on dogs naturally or experimentally infected with canine leishmaniasis. Two species of sandfly were used, *Phlebotomus sergenti* var *mongolensis* and *P. chinensis*. Both became infected with flagellates but the latter more readily than the former which lost its infection when the blood meal was completely digested. In *P. chinensis* the infection persisted and extended forwards to the pharynx and proboscis a feature which was not observed in the transitory infection in *P. sergenti*. In the case of both sandflies flagellates were found in the hind gut while

they were seen in faeces deposited by one *P. chinensis*. The rate of infection of the sandflies was directly proportional to the degree of infection of the skin of the dogs. One dog with a heavy skin infection led to the infection of the majority of both species of sandfly fed on it. The results with the canine disease agree fairly closely with those previously obtained in the case of human kala azar by YOUNG and HERTIG 1928 PATTON and HINDLE 1927 HINDLE 1928 and WU and SUN 1938 who concluded that *P. chinensis* was the host for the parasite of human kala azar. The present finding that this sandfly is a satisfactory host for the parasite of canine kala azar affords an explanation of the frequent occurrence of the canine disease in Peiping and may also throw light on the epidemiology of human kala azar should it be proved that the human and canine diseases in China are identical. [See also this *Bulletin* 1927 Vol. 24 pp 183 639 1929 Vol. 28 p. 311 1938 Vol. 35 pp 861 862] C M IV

- GIRAUD (Paul) & BERGIER (Pierre) *Epidémiologie de la leishmaniose humaine à Marseille.* [Epidemiology of Human Kala Azar in Marseilles.]—*Bull et Mém Soc Méd Hôp de Paris* 1899 Apr 10. 55th Year 3rd Ser No 12 588-591 With 1 chart
 — & — Recherches sur le mode de transmission de la leishmaniose dans la région marseillaise [Mode of Transmission of Kala Azar in the Marseilles Region.]—*Ibid* pp 591-593
 — CABASSU (H.) & BERGIER (Pierre) Recherches sur l'endémie de leishmaniose canine à Marseille. [Endemic Canine Kala Azar in Marseilles.]—*Ibid* pp 594-596. With 1 chart.

In these three papers the epidemiology of kala azar in Marseilles is discussed. In human beings the disease most commonly attacks children between the ages of one and three. By far the greater proportion of cases comes from the districts round Marseilles itself or from houses in the suburbs where there are gardens. Canine kala azar is also common and is found chiefly in the same districts as the human cases. The conclusion is that kala azar is essentially a canine disease which passes to human beings accidentally. Of vectors the authors suspect the dog tick which is found in greatest numbers on the types of dog most subject to kala azar namely hunting dogs and police dogs. The dog tick bites children which play about on the ground and come into closer contact with dogs than do adults amongst whom the disease is rarely found. The sandfly bites adults as frequently as children, and dogs less often. One case is mentioned in which a child suffered from the tick-borne *fièvre boutonneuse* in September and kala azar in November of the same year. The question is asked was this an instance of simultaneous inoculation of two viruses? The possibility of the dog louse (*Linognathus pulicis*) being a vector is put aside in spite of the fact that Professor JOYEUX is stated to have shown that leishmania will develop in it. C M IV

- SERGEANT (Edm.) PARROT (L.) DOXATIEU (A.) & LESTOQUARD (F.) *La prophylaxie de la leishmaniose générale méditerranéenne.* [Prophylaxis of Mediterranean Kala Azar.]—*Arch. Inst. Pasteur d'Algérie* 1899 June Vol 17 No. 2 pp. 221-230.

The paper discusses the prophylaxis of Mediterranean kala azar, which occurs in human beings and dogs and appears to be transmitted by sandflies, chiefly *Phlebotomus perniciosus* from dog to dog and

from dog to human being rather than from one human being to another. In practically all centres of the disease there are more cases amongst dogs than human beings while sandflies are much more readily infected by feeding on dogs owing to the tendency in these animals for the parasites to be present in large numbers in the skin [see DA CUNHA below]. It has been found that reduction in the human reservoir by treatment of all cases has not been followed by a lowered incidence of the disease. As the disease mostly affects children contact of these with dogs should be prevented. All known infected dogs and all stray unowned dogs should be destroyed. The movement of dogs into and from known centres of the disease should be forbidden it being borne in mind that many dogs harbour parasites without showing any signs of their infection. As regards sandflies protection from bites can be largely effected by the use of a sufficiently fine net at nights while destruction of flies in the rooms can be carried out. Breeding can be prevented to some extent by working the land round the house burying accumulations of rubbish and generally keeping the surroundings clean.

C M W

DA CUNHA (Aristides Marques) Infecção da pelle na leishmaniose visceral experimental do cão [Condition of the Skin in Dogs experimentally infected with Kala Azar]—*Brasil Médico* 1938 Nov 26 Vol. 52, No 48 pp 1071-1072.

A study of the skin of dogs experimentally infected with the leishmania of S American kala azar has shown that as in the case of dogs in the Mediterranean region it becomes infiltrated with macrophages containing parasites. The skin apart from the presence of macrophages may be quite normal and have no visible signs of infection or there may develop areas of tumefaction in which numerous leishmania can be found. The observations like others that have been made before lend support to the view that the parasite of S American visceral leishmaniasis is identical with *Leishmania infantum*.

C M W

FENG (L. C.) CHUNG (H. L.) & HORFFLI (R.) Canine Leishmaniasis with Skin Lesions observed in Peiping—*Chinese Med J* 1939 Apr Vol. 55 No 4 pp 371-382. With 15 figs. on 4 plates.

The paper gives an account of twelve dogs which were found to be suffering from canine leishmaniasis in Peiping. In all cases diagnosis was established by the finding of leishmania in smears from cutaneous lesions. The symptoms in these dogs were seborrhea, scaling and depilation of the skin small nodules ulcerations on various parts of the body but especially on the ears face nose and round the eyes. In two dogs keratitis was noted and marked emaciation in five. The other dogs appeared quite healthy apart from the skin lesions. In none of these cases was examination of the internal organs carried out but there is little doubt that the dogs were suffering from canine kala azar.

C M W

Ho (E. A.) A Note on the Coincidence of Human Kala-Azar and Canine Leishmaniasis with Cutaneous Lesions in a Household.—*Chinese Med J* 1939 June Vol. 55 No 6 pp 568-567.

The author notes that one of the twelve dogs reported as suffering from canine leishmaniasis in another paper reviewed here [FENG

CHUNG and HOEPLI above] came from a house in which a case of kala azar in a child $2\frac{1}{2}$ years of age occurred. The dog had commenced to show skin lesions as evidence of its infection about a year before the appearance of the first symptoms in the child. A similar association of canine and infantile kala azar in a house in Peiping has been reported by LEE in 1937

C M W

MENDES (A B Corrêa) Leishmaniose nos cães de Lisboa. [Leishmaniasis in Lisbon Dogs.]—*Arguinos Inst. Bact. Camara Pexiana*. 1938 Vol 7 No 3 pp. 389-395 English summary

In 1911 ALVARES and PERRIRA DA SILVA reported the finding in Lisbon of 13 cases of canine kala azar amongst 418 dogs examined. In the present paper the author records the discovery of leishmania in 5 of 240 dogs examined post-mortem. In all cases but one the presence of parasites was associated with a positive formol-gel reaction but in three cases giving a positive reaction leishmania were not found, though two of these were instances of infection with *Dirofilaria immitis* and one with *Babesia canis*.

C M W

PAPANTOAKIS (Evangelos) Bekämpfungsmassnahmen der kala Azar in Canea/Kreta. [Kala Azar Control Measures in Canea (Crete).]—*Arch f. Schiffs u. Trop Hyg* 1939 June, Vol. 43, No. 6 pp. 273-275 With 1 fig

The close association of human and canine kala azar in Canea in Crete has strengthened the belief that the dog is acting there as the reservoir of infection which is transmitted to human beings by sandflies. The destruction of the majority of the dogs in the district of Canea in 1933 was followed by a markedly lower incidence of human kala azar in the following year. Accordingly regulations were drawn up by the Health Department insisting on an inspection of all dogs of Canea in April of each year. Each dog was examined clinically as well as serologically by the formol-gel test. All sick dogs and those giving a positive test were killed. Furthermore if in any village of the district a case of human kala azar occurs, all the dogs of the village are to be at once destroyed. Anyone who objects to his dog being killed may take it for test to the Hygiene Centre in the town as in the case of the town dogs. The residents of such a purged village can only acquire new dogs in the months of January or February while the animals must be under two months of age and must have come from villages where no cases of the human disease have been reported.

The general inspection of dogs in Canea was first carried out in April 1938. Of 1115 dogs 229 gave a positive formol-gel test. Of these 70 per cent. showed no signs of disease, 25 per cent. merely some wasting and loss of hair and only 5 per cent. the characteristic signs of canine kala azar

C M W

BLANC (G) Leishmaniose viscérale généralisée observée chez un écureuil (*Verus getulus* L.) au Maroc. [Generalized Kala Azar in a Squirrel (*Verus getulus*) in Morocco.]—*Bull. Soc. Path. Exot.* 1939 July 12, Vol. 32, No. 7 pp. 756-781 With 2 plates. [12 refs.]

Among a number of squirrels (*Verus getulus*) bred at the Pasteur Institute in Morocco one was discovered to have died of a very intense

leishmania infection. The origin of the infection could not be traced as no animals with this infection had been housed in the building for some time. It is admitted that dogs and possibly other animals may harbour leishmania though they appear quite healthy. Furthermore it was not possible to identify the species of parasite as the infection was not transmissible to other animals owing to the decomposed state of the body of the squirrel. The possibility of this animal being a reservoir for leishmania infection is discussed though it is admitted that the only conclusion that can be drawn from the facts is that it is susceptible to infection. C M W

MURANO (Giulio) & VECCHIO (Federico). Sull'interessamento del sistema reticolo-istiocitario nella leishmaniosi interna. I. L'anemia da leishmaniosi interna. [Relation of the Reticulo-Endothelial System to Kala Azar. I. The Anaemia of Kala Azar].—*Pediatrics* 1939 July, Vol. 47 No 7 pp 545-563 [43 refs.]

An examination of the blood of a number of cases of infantile kala azar in Naples and the study of rabbits by blockages of the reticulo-endothelial system has led the authors to the view that the anaemia of kala azar cannot be attributed to any haemolytic process. It is due rather to a hyperplasia of the bone marrow caused by alterations in the reticulo-endothelial system brought about by the leishmania. C M W

MENON (T. Bhaskara). The Splenic Reaction in Kala-Azar.—*Trans Roy Soc Trop Med & Hyg* 1939 June 29 Vol. 33 No 1 pp 75-86 With 8 figs. on 4 plates. [47 refs.]

This study, based on material from ten fatal cases of kala azar has shown that the disease is a reticulo-endotheliosis caused by a parasitic invasion of the cytoplasmic reticular syncytium. There is a gradual differentiation of the reticulo-endothelial tissue to form free histiocytes which are also parasitized. The splenic reaction affords suggestive evidence for the presence in the spleen of two types of phagocytic cell with differing powers of phagocytosis. In the later stages there is a spread of infection to the lymphatic reticulum of the spleen. Such an activation and invasion of the lymphatic reticulum is offered as the explanation of the involvement of the lymphatic tissue in the disease. Reticulo-endothelial blockage is regarded as the probable cause of the anaemia and tendency to inflammatory complications. C M W

DE VRIES (A). On the Connection between the Formol-gel Reaction and the Blood Proteins.—*Acta Med Scandinavica* 1939 Vol 89 No 5 pp 425-434 With 1 graph. [11 refs.]

In this paper the author gives an account of his examination of the serum from a large number of different diseases. He has found that whenever the total globulin content reached 37 parts per thousand the formol-gel reaction was positive while it was uniformly negative when the value fell to below 36 parts per thousand. Between 36 and 37 the reaction was either positive or negative. A decrease in the albumin content had little influence on the reaction. It is clear

- GATTI (C.) BOGGINO (J) & PRIETO (C) Un nouveau foyer de leishmaniose viscérale en Amérique du Sud. [A New Focus of Kala Azar in S. America.]—*Bull. Soc. Path. Exot.* 1939 June 14 Vol 32 No 6 pp 602-605 With 1 fig

The paper describes a case of kala azar in an adult Paraguayan. Though he had travelled, a residence of a year in Yungas in the north of Bolivia before the first symptoms of infection developed appears to indicate that this district must be added to those already recognized as centres of the disease in South America. The other centres are those of Matto Grosso on the borders of Brazil and Paraguay those of Salta and Chaco in Northern Argentina and that of North-Eastern Brazil, south and east of Para. C M W

- FERRABOLI (L.) JAUMES (C) & JUDE (A) Remarques cliniques sur deux cas de kala azar [Clinical Observations on Two Cases of Kala Azar]—*Rev. Méd. et Hyg. Trop.* 1939 Mar-Apr Vol 31 No 2 pp 58-61

Two cases of kala azar are described in adults who had returned to France from Morocco and French Somaliland. It seems probable though not quite certain, that the infections had been contracted in these countries. In one case the diagnosis was difficult owing to the main symptoms resembling those of acute peritonitis. In the other the early stages of the disease were afebrile the patient being admitted to hospital for general debility combined with enlargement of the liver and spleen. A diagnosis of curthosis was made. It was not till six months later that the first febrile symptoms developed. The first case was much more resistant to antimony treatment than the second several courses of large dose being required to bring about a cure. C M W

- ERMEN (Johannes) Die Wirkung von 3- und 5wertigem Antimon auf das weisse Blutbild bei gesunden und mit kala-azar infizierten Hamstern [The Influence of Tri and Pentavalent Antimonials on the Leucocytes of the Blood in Healthy and Kala Azar Infected Hamsters.]—*Ztschr. f. Immunopath. u. Experim. Therap.* 1938, July 8 Vol 83 No 3/4 pp 209-228. With 5 figs. & 7 charts [22 refs]

This paper has already been the subject of a review [this *Bulletin* 1938, Vol 35 p 870] but it was there erroneously stated that a leucocytosis followed the administration of fousadin to healthy hamsters, whereas the reverse is the case. It thus appears that neostibosan administered to hamsters produces a marked histocyte response as well as an increase in the number of leucocytes an action which is related to the therapeutic efficiency of the drug in the treatment of leishmania infections in these animals. Fousadin not effective for treatment produces only a very slight histocyte response and a decrease in the number of leucocytes. C M W

- WANG (C W) Solustibosan in Treatment of Kala Azar in Chinese Hamsters.—*Proc. Soc. Experim. Biol. & Med.* 1939 May Vol 41 No 1 pp 152-155

The authors have found that in the treatment of Chinese hamsters, daily subcutaneous injections of solustibosan (120 mgm. of Sb) for

10 to 25 days showed a lower cure rate than neostibosan (168 mgm. of Sb) given in the same way over the same period. Further more the curative effect of solustibosan did not increase with the increase of the frequency of injections. Daily injections of either drug appear to be less effective than bi weekly or tri weekly injections. This result probably depends on the fact demonstrated by BRAHMA CHARI that when the antimony in the tissues reaches a certain level the excretion by the kidneys becomes suddenly increased out of all proportion to the antimony in the tissues. C M W

AVERSA (Tommaso) Primi tentativi di cura della leishmaniosi viscerale infantile col solustibosan (Nota preventiva.) [Treatment of Infantile Kala Azar with Solustibosan.]—*Pediatrics* 1939 June. Vol. 47 No 6 pp 486-489

Very good results have followed the use of solustibosan in the treatment of five cases of infantile kala azar in Messina. The preparation was better tolerated than other organic antimonials.

C M W

MIRZOJAN (N. A.) Traitement de la leishmaniose viscérale par la sourmine [Treatment of Kala Azar by Sourmine]—*Med Parasit & Parasitic Dis* Moscow 1938. Vol. 7 No 4 [In Russian pp 596-605 [15 refs] French summary p 605]

The paper reports that the synthetic organic antimony preparation named sourmine and prepared in the USSR is very efficacious in the treatment of visceral leishmaniasis in Samarkand.

According to the constitutional formula given in the text sourmine is the sodium salt of 3-chloro-4-acetylamino phenylstibonic acid i.e. it is identical with the German drug stibosan which was the first improvement on stibacetin and was discarded in favour of von Heyden 693 which was in turn replaced by neostibosan.

C M W

DAS GUPTA (N. C.) Allergie (?) Symptoms in Cases of Kala-Azar treated with Antimony Salts.—*Jl Indian Med Assoc* 1939 Jan. Vol. 8. No 4 p 237

Two cases are mentioned in which allergic symptoms developed shortly after the intravenous injection of a dose of ureastibamine for the treatment of kala azar. In both cases there was the development over the body of an urticaria like eruption. One patient became unconscious while the other developed uterine haemorrhage. The author says that such cases were common in the early days of ureastibamine but since smaller doses (0.01 to 0.10 gm.) have been given the allergic symptoms have not been seen while the treatment has been quite effective.

C M W

POGGI (Igino) & MONTE (Giuseppe) Esteso focolaio endemico di leishmaniosi cutanea in Provincia di Forlì. [Large Endemic Focus of Oriental Sore in the Province of Forlì.]—*Ann d'Igiene* 1939 June Vol 49 No 6 pp 375-379 With 2 figs & 1 map

The authors have shown that oriental sore is common in the villages of the valley of the Conca in the province of Forlì, in Italy. It appears

in two there were mucosal lesions only. Fouadin administered intra muscularly appears to be the treatment of choice for these conditions. The recent discovery in Brazil and northern Argentine of cases of visceral leishmaniasis leads the author to suspect that cases will be discovered in Yacacuy. He recalls that the first case of kala azar in S. America to be recorded was one seen by MIGONE in 1913 in Asuncion while two cases were noted by MAZZA in 1928 in the Argentine.

C M W

WEINMAN (David). Factors affecting the Morphology of *Leishmania tropica*. The Production of Leishmaniasis Forms in Cultures.—*Parasitology* 1939 July, Vol 31 No 2 pp 185-192. [16 refs.]

The paper describes experiments which have shown that under certain conditions of culture the flagellate forms of leishmania will be transformed into the tissue-invading leishmania forms. Though the guineapig is refractory to inoculation with leishmania and though the parasite will not develop in guineapig tissue cultures, it will multiply in pieces of guineapig tissue (spleen or lung) which are placed on the surface of the NNN blood agar or Zinsser's serum-Tyrode agar. The pieces of tissue about 2.5 mm in diameter are removed from the animal aseptically, washed in Tyrode's solution and then bathed in rich culture from tubes of NNN medium for 15 to 30 minutes. The pieces of tissue are then placed on the agar slopes and incubated at 33° to 37°C. The cells of the tissue appear to survive for eleven days or longer during which living leptomonads live and multiply in the drop of the liquid which collects round each piece of tissue while in the tissue itself typical leishmania forms appear and multiply. The best results were obtained with guineapig lung, though the spleen of this animal and even that of the frog behaved similarly. The serum Tyrode-agar was prepared as follows. To 150 cc. of 3 per cent. agar at 50°C is added a mixture (warmed to 30°C.) consisting of 150 cc. of sterile double strength Tyrode solution, 100 cc. of horse serum and 8 cc. of 0.04 per cent. aqueous solution of phenol red. After mixing the medium is tubed and slanted. After sterility has been proved by incubation the cotton plugs are replaced by rubber caps and the tubes stored at 8°-10°C. Tubes three months old have given satisfactory results.

C M IV

ENQUIRIES

To the Director

Bureau of Hygiene & Tropical Diseases.

Sir

In regard to your correspondent's request [this *Bulletin*, 1939 Vol. 36, p. 789] for any reference to viability of hookworm eggs in sewage after tank treatment, it is but just to Ch. Wardell Smith to point out that evidence for such destruction in household septic tanks goes back to his pioneer work published in 1911. In his first Annual Report as Scientific Secretary of the Rockefeller Sanitary Commission for the Eradication of Hookworm Disease he reported that when faecal material was subjected to decomposition in water for 70 days nearly all, and when so subjected for 117 days all, hookworm eggs were dead, and in these conditions, at least 80 per cent. of *Ascaris* eggs were dead in four months.

These observations were made to test the value of the L.R.S. (Lumaden Roberts Stilcs) privy designed for one country family and described in U.S. *Public Health Reports* 1910 Nov 11 another description of it followed in the *Farmer's Bulletin* 463 of the U.S. Department of Agriculture 1911 while that of a modification in concrete appeared in *Public Health Bulletin* No 68 issued in 1917 by the Treasury Department U.S. Public Health Service On the L.R.S. privy was based the Aqua privy a factory made concrete cylinder with drowned unscreened outlet [LANE 1917 *Indian Jl Med Res* Vol. 5 p 350 and Hookworm Infection 1932, p 253] In all these privies the practical sanitary point in view is the prevention by the effluent of the conveyance to the soil of any but dead and thereby lightened eggs no longer lying in the sediment for currents in the tank must not disturb the sediment for that purpose the design of the concrete L.R.S. privy seems to be the best for the family of a country homestead

Yours etc.

October 2 1939

Clayton LANE

REVIEWS AND NOTICES

RICHARDS (Audrey I) [M.A.(Cantab) Ph.D (London) etc.] *Land, Labour and Diet in Northern Rhodesia An Economic Study of the Bemba Tribe*—pp xiv+415 With 16 plates 5 figs. 2 maps & 1 chart. Published for the International Institute of African Languages & Cultures. 1939 London New York Toronto Humphrey Milford, Oxford University Press [30s.]

This book deals with every aspect of the diet of the Bemba, from the preparation of the gardens and sowing of the seed or the gathering of the leaves of wild plants to the sharing-out of the cooked meal to the members of the family circle The apportioning of land to the head of the family and the effect on the agricultural output in the villages of prolonged absence of the males at the mines or European plantations are also discussed.

Charts and Tables are given showing how the men and women occupy their time when at home the kinship composition of a village and the individual intake of flour from day to day in family groups.

The Bemba better known as the Aweremba to those familiar with North East Rhodesia in its early days were a warrior tribe with a highly developed political system The paramount chief exercised a rigid control over his subjects and was entitled to exact free labour from them for his own or for tribal business In the course of the last half-century or less the tribe has had to adapt itself to a peaceful agricultural existence. Latterly has come the attraction of work at the mines at wages which bring many European made goods within the workers reach.

The mode of life of the Bemba has therefore undergone more radical changes than has that of most African tribes and they hardly seem to have completely adapted themselves to the changed conditions. As agriculturists for instance they are distinctly backward. For this reason it is questionable whether a wise choice was made in the Bemba when seeking a tribe to be the subject of a dietetic study

In a Foreword to the volume Dr Richards modestly states as her aim, the giving of a broad idea of the extent and variety of nutritional

JACK (Rupert W) [Chief Entomologist]. *Studies in the Physiology and Behaviour of Glossina morsitans* Westw.—*Southern Rhodesia Memoirs of the Department of Agriculture* No 1 1939 May pp 203—vii With 27 figs & 3 plates. [37 refs.] Salisbury Govt Stationery Office

The first serious account of laboratory work on the physiology of the tsetse fly was published by Burton and Lewis in 1934 [this *Bulletin* 1935 Vol 32, p 389]. Since then a good deal of similar work has been done and considerable progress has been made but the paper under consideration is the first detailed account of experiments in the laboratory using *Glossina morsitans*. It describes a large number of experiments made mainly in Salisbury by Mr R. W. Jack and his technical assistants.

The results are given in two main sections, the first dealing primarily with physiology and the second with behaviour. The reactions of the adult and pupa were determined under a variety of conditions of temperature and humidity. The results are generally similar to those obtained using other species of tsetse. The insect is seen to be adversely affected by extremes of heat, cold and dryness. On certain processes, e.g. fat metabolism the author tries to assess the effects of the unnatural conditions inseparable from captivity. The experiments on the behaviour of the flies and their reactions to light and other stimuli are of interest, though it is not certain whether they always indicate the reactions of the wild fly in the field.

The present reviewer considers that all these laboratory experiments reveal something of the physiology of the insect concerned, provided that caution is exercised in the interpretation of the results. Only by laboratory work can we hope to understand fully the physiology of the tsetse and until the physiology is really understood, satisfactory and permanent control is unlikely. Unfortunately the kind of information obtained in the laboratory is not always of direct practical value and it is even possible that with misinterpretation it may in practice do more harm than good if the results are applied indiscriminately in the field. Laboratory workers are aware of this and are afraid that their methods may sometimes come into disrepute if the results are put into practice too soon. The information contained in the paper under consideration will serve as a basis for further exact knowledge of *Glossina morsitans* even if the interpretations the author gives may sometimes have to be modified.

Most tsetse workers seem to have some difficulty in fixing on suitable units for expressing their data. In this paper the normal metric units (including the Centigrade thermometer) are used as a rule but occasionally the author breaks out into millibars and Fahrenheit and on one occasion he gives the saturation deficiency of the air in grams per cubic meter—a unit the reviewer has never found before even in the tsetse literature. Strict uniformity in these matters is surely desirable.

Kenneth Mellanby

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Page numbers within brackets indicate papers not summarized.

Am. signifies Amoebiasis and Amoebic

Bb	Beriberi.	Dysentery
Bl.	Blackwater	
B.R.	Book Review	
Chl.	Cholera.	
Der	Tropical Dermatology	
Diet.	Deficiency Diseases including Epidemic Dropsy	
Dys.	Dysentery (Bacillary and Unclassed)	
Fev	Fevers.	
Hel.	Helminthiasis	
Leish.	Leishmaniasis.	
Lep.	Leprosy	

Lept	signifies Leptospirosis.
Mal.	Malaria.
Misc.	Miscellaneous.
Oph.	Tropical Ophthalmology
Pel	Pellagra.
Pl.	Plague
Rab	Rabies.
R.B.F	Rat Bite Fever
Rep	Medical and Sanitary Reports
R.F	Relapsing Fever and other Spirochaetosis
Sp	Sprue.
Tryp	Trypanosomiasis.
Vms	Venoms and Antivenoms.
Y.F	Yellow Fever
Y & S	Yaws and Syphilis

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JACK (Rupert W) [Chief Entomologist]. *Studies in the Physiology and Behaviour of Glossina morsitans* Westw.—*Southern Rhodesia Memoirs of the Department of Agriculture* No 1 1939 May pp 203+vi. With 27 figs & 3 plates. [37 refs.] Salisbury Govt Stationery Office.

The first serious account of laboratory work on the physiology of the tsetse fly was published by Buxton and Lewis in 1934 [this *Bulletin* 1935 Vol 32 p 369]. Since then a good deal of similar work has been done and considerable progress has been made but the paper under consideration is the first detailed account of experiments in the laboratory using *Glossina morsitans*. It describes a large number of experiments made mainly in Salisbury by Mr R. W. Jack and his technical assistants.

The results are given in two main sections the first dealing primarily with physiology and the second with behaviour. The reactions of the adult and pupa were determined under a variety of conditions of temperature and humidity. The results are generally similar to those obtained using other species of tsetse. The insect is seen to be adversely affected by extremes of heat cold and dryness. On certain processes i.e. fat metabolism the author tries to assess the effects of the unnatural conditions inseparable from captivity. The experiments on the behaviour of the flies and their reactions to light and other stimuli are of interest though it is not certain whether they always indicate the reactions of the wild fly in the field.

The present reviewer considers that all these laboratory experiments reveal something of the physiology of the insect concerned, provided that caution is exercised in the interpretation of the results. Only by laboratory work can we hope to understand fully the physiology of the tsetse and until the physiology is really understood, satisfactory and permanent control is unlikely. Unfortunately the kind of information obtained in the laboratory is not always of direct practical value, and it is even possible that with misinterpretation it may in practice do more harm than good if the results are applied indiscriminately in the field. Laboratory workers are aware of this and are afraid that their methods may sometimes come into disrepute if the results are put into practice too soon. The information contained in the paper under consideration will serve as a basis for further exact knowledge of *Glossina morsitans* even if the interpretations the author gives may sometimes have to be modified.

Most tsetse workers seem to have some difficulty in fixing on suitable units for expressing their data. In this paper the normal metric units (including the Centigrade thermometer) are used as a rule, but occasionally the author breaks out into millibars and Fahrenheit and on one occasion he gives the saturation deficiency of the air in "grams per cubic meter" a unit the reviewer has never found before even in the tsetse literature. Strict uniformity in these matters is surely desirable.

Kenneth McIlanby

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The bracketed abbreviations after the page numbers indicate the subjects.
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Am. signifies Amoebiasis and Amoebio

Dysentery

Lept. signifies Leptospirosis.

Bb	Berberi.	Mal.	Malaria.
Bl	Blackwater	Misc.	"
B.R.	Book Review	Oph.	Miscellaneous.
Chl.	Cholera.	Pl.	Tropical Ophthalmology
Der	Tropical Dermatology	Pl.	Pellagra
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Dys.	Dysentery (Bacillary and Unclassified)	R.B.F	Rabies.
Fev	Fevers	Rep	Rat Bite Fever
Hel	Helminthiasis.	R F	Medical and Sanitary Report
Leish.	Leishmaniasis.	Sp	Relapsing Fever and other Spirochaetoses
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— with Hoeppli & Chu 35 (Hel.)
Fernandez J M M 692 (Lep)
Fernandez L J & Fernandez, R. F., 458
(Opb.)
Fernando, A. & De Ocampo G 51 (Y & S)
Fernando, C F 896 (Fev)
Fernando P B 828 (Hel)
— d'Silva, M. Stork, G H V -
tamby G R

- Cremer S de G 690 (Lep)
 Cristiani, M 681 bis (Tryp)
 Crocker C G with Pijper 468 (Fev)
 Crosby B L with Schapuro & Seckler 149 (Hel)
 Crouch, H A 18 (V F)
 Cruveilhier L Deryck J & Viala, C 732 (Rab)
 — Lépreux P & Viala, C 197 (Rab)
 — with Nicolas Trache hopciowska & Viala, 195 (Rab)
 — & Viala, C 187 (Rab)
 Cufodot F with Bernet & Taf 835 (Oph)
 Culbertson J T 560 (Hel) 751 ter 752 (Tryp)
 — & Kaplan S S 145 (Hel)
 — & Keweler W R 730 (Tryp)
 — & Kolodny M H 231 (Tryp)
 — with Zwemer 745 (Tryp)
 Cummins H S 647 (V F)
 Cummins S L 343 (Misc)
 da Cunha, A M 447 ter 1027 (Lesh)
 — with Chagas Ferreira, Deane, L. Deane G (Gummaries, on Paumgarten & SA 416 (Lesh)
 — & Deane E 451 1035 (Lesh)
 Curran, G 414 (Misc)
 Curry J G with Sorkley 400 (Mal)
 Curry D P with Simmons, Callender Schwartz & Randall 874 (B R)
- D.
- van Daale G 913 (Diet)
 Daengwang, S & Tanawat, P 156 (Hel)
 Dangerfield, W G with Bourneall & Wormald, 668 (Tryp)
 Danglemont F with Jolly 782 (Mal)
 Danel, with d Oeleurtz, Saena & Raibaud, 451 (Lesh)
 Danilova, M I & Boudymko, F A 481 (Mal)
 Dan Van Thai, with Hénreux & Roocin, 916 (Mal)
 Das, B K with White, 14 (Mal)
 Das, P C with Lahuri, 577 (Chl)
 — with Pasricha & Chatterjee 577 (Chl)
 — with — & Lahuri, 567 (Chl)
 Das Chowdhury D K with Bemb, 1009 (Mal)
 Das Gupta B M 114 (Lept) 1006 (Mal)
 — with Chopra, 1012 (Mal)
 — & — 565 (Mal)
 — with — & Sen, 499 (Mal)
 Das Gupta, N C 1033 (Lesh)
 Desannayaka, W L P 834 (Hel)
 Dastidar S K G 1031 (Lesh)
 Datta Roy D K with Vardone, 577 (Chl)
 Davey T H 469 (Fev)
 — & Gordon, R M 862 (Mal)
 David, J 622 (Hel)
 Davies, H N 343 344 (Misc)
 Davis, A P 1017 (Lep)
 Davis, E C 300 (Am)
 Davis, G E & Cox H R 479 (Fev)
 — & Parker R R 477 (Fev)
 — with — 479 (Fev)
 Day J B 685 (Tryp)
- Day P L with Shukers & Langston, 424 (Mac)
 De, S S with Ghosh, 836 (Vms)
 — with — & Bhattacharya, 835 (Vms)
 Deane G with Chagas, da Cunha, Ferreira, Deane, L. Gummaries, von Paumgarten & SA 416 (Lesh)
 Deane L with Chagas, da Cunha, Ferreira, Deane G Gummaries, von Paumgarten & SA 416 (Lesh)
 — with Ferreira, 754 (Tryp)
 — with — Mangaberra & Chagas, 449 (Lesh)
 — & Jansen, G 754 (Tryp)
 Debidas, N 914 (Diet)
 Debono J E 842 (Misc)
 DeBask, C. K. 533 (Mal)
 Decourt, P 498, 782, 816 (Mal)
 — with Deschena, 292 (Am)
 — & Schneider J 536 bis (Mal)
 Degotta, J 535 1016 (Lep)
 —, with Dabon, 535 (Lep)
 Déjov, L 842 (Hel) 918 (Misc)
 — with Advner 842 (Hel)
 De la Barrera, J M with Alfaro, 962 (PL)
 — & Cornea, P 316 (PL)
 Delacoux des Roceaux, with Vallette & Dalacourt, 450 (Lesh)
 Delbova, P with Alain, 947 (Misc)
 Del Ferro, E 574 (Chl)
 Del Frade A with Anza, 395 (Mal)
 Delademtrone, G 747 (Tryp)
 Delpy L & Raby, A. 757 (R F)
 Del Vecchio G 681 (Mal)
 Demina, P A 932 (Mal)
 DeMonte, A J H 905 (Chl)
 — & Gupta, S K 579 (Chl)
 — with Pasricha & Chatterjee, 579 (Chl)
 Dempster G O 320 (Hel)
 Denéchev, D & Mandroet, J 771 (Lept)
 Denchev, H with an den Bergh, 628 (Hel)
 Denovan, A E B 839 (Hel)
 Deo, L R S with Chatterjee, 281 (Chl)
 Depreux M with Pauly 546 (Pel)
 Derrick, E H 469 (Fev)
 Deschena, R 254 257 290 bis 291 (Am) 830 (Hel)
 — & Decourt, P 292 (Am)
 — with Dopter 255 bis, 299 (Am)
 — & Provost, A 305 (Am)
 — with Roehaud, 835 (833) (Hel)
 Des Lants, J Q 840 (Lep)
 Deson, E H & Abely P 14* (Mal)
 Desribata, with Sanner 483 (Fev)
 Desriat, R 969 bis (PL)
 Devine, J 13 (Mal)
 Dexter L with Gardner 783 (Mal)
 Diamantia, A 822 (Hel)
 Dias, E 220 (Tryp) 477 (Fev)
 — with da Cunha, 451 1035 (Lesh)
 — with Philip, 608 (Fev)
 — & Torrealba, J F 229 (Tryp)
 Diaz, B 323 (Hel)
 Dickson, E C 506 (Misc)
 — & Gifford, M A 507 (Misc)
 Deryck, J., with Cruveilhier & Viala, 7 (Rab)
 Diggs, L W & Babb J., 936 (Misc)
 Digonnet, L & Mathias, M., 766 (R F)

- Ghermani, A. with Claudian, 546 (Pel.)
 Ghidini, G. M. 214 (Tryp.)
 Ghotal, S. C. with Lal & Mukherji 886 (Chl.)
 Ghose A. H. (724) (Hel.)
 Ghosh, B. N. 179 (B.R.)
 — & De S. S. 856 (Vms.)
 — — & Bhattacharya D. P. 855 (Vms.)
 Ghosh, H. 379 (Chl.)
 Gibbs, J. H. 578 (Vms.)
 Gibbins, E. G. (843) (Hel.)
 Gibbons, R. J. 474 (Fev) 867 (Pl.)
 Gifford, M. A., with Dickson, 607 (Misc.)
 Giglioli, G. 809 (Mal) 940 (Misc.)
 Gillet, R. (680) (Mal.)
 Gimlette J. D., 432 (B.R.)
 Gioseffi M., 347 (Misc.)
 Giovannola, A. (623) (Hel.) 919 930 (Mal.)
 Girard G., 310 (Pl.)
 — & Girard, M., 971 (Pl.)
 — & Robb, J. 314 (Pl.)
 Girard P. & Berger P. 1028 bis (Leish.)
 — Cabasso H. & Berger P., 1028 (Leish.)
 — & Poinso R., 450 (Leish.)
 Giroud P. 982, 983 (Fev)
 — & Panthier R. 984 994 (Fev)
 Giallo, B. 35 (Hel.)
 Glanta, B. & d'Ignazio C. 989 (Fev)
 Glotzer S. 115 (Lept.)
 Glover R. E. 725 (Rab.)
 Glueck, H. I. with Rachmulewitz 552 (Pel.)
 Grander E. J., 52 (Y. & S.)
 Gormanson J., with Leifson 738 (Tryp.)
 Godal, J., 104 (Der.)
 Gohar M. A., 471 (Fev)
 Gohar N. 103 (Der.)
 Gohard, P. 952 (B.R.)
 de Goldflem, A. S. & de Goldflem J. S. 697 (Lep.)
 Goldman, D. 398 (Mal.)
 Goldstein F., with Manwell, 1011 (Mal.)
 Gomez, J. M. 90 (Der.) 241 (Lep.)
 Gómez López, L. & Lana, G., 718 (Hel.)
 Gomi T., with Kubo & Baba, 604 (Misc.)
 Goodman M. H., 349 (Misc.)
 Goodwin M. H. Jr with Hill, 261 (Mal.)
 Gopaul, W. L., 383, 841 (Hel.)
 Gorbitz, G., 257 (Mal.)
 Gordon L. S. with Wright & Boncevlch, 846 (Hel.)
 Gordon, R. M., with Davey 582 (Mal.)
 Gore, R. N., 396 (Mal.)
 Goret, P. & Mariette, C., 195 (Rab.)
 Gouget, R. (680) (Mal.)
 Gounon A. F. X., (141) (Mal.)
 Goyal, R. K., with Chopra, Paricha, Lal & Sen, 909 (Diet.)
 Goyte, A. N. 888 (Chl.)
 Gradio H. S. 457 (Oph.)
 Grant, H. M. with Spies & Huff 557 (Pel.)
 Grant, J. M. with Spies, Stone & Mc Lester 555 (Pel.)
 Grasso R., 303 (Am.)
 Gratch, I. with Negri, (135) (Mal.)
 Gratian, H. W., 385 (Chl.)
 Graman, with Huard & Long, 296 (Am.)
 Grecou, A. Ionescu, N. G. & Constantinescu, P. 552 (Pel.)
 Green J. G. 362 (Mal.)
 Green R. 382 (Chl.)
 Greval S. D. S. Chandra S. N. & Woodhead, L. S. F. 935 (Misc.)
 — Lowe J. & Bose R. 537 (Lep.)
 — Sen Gupta, P. C. & Napier L. E., 1030 (Leish.)
 Grobler J. M. with Finlayson 861 (Vms.)
 Gross, M. 420 (Misc.)
 Grunels, P., 604 (Dya.)
 Guenev C. with Pavlov 749 (Tryp.)
 Guest, C. 397 (Mal.)
 — with Field & Niven 493 (Mal.)
 Guilbert, J. & Boreq H. 218 (Tryp.)
 Guillaumon F., with Tisseul, 694 (Lep.)
 Guillaumon F. 535 (Lep.)
 Guillermin, J., with Bernard & Gallut, 373 bis 374 (Chl.)
 Guimarães, F. N. with Chagas da Cunha, Ferreira Doane L., Doane, G., von Paumgarten, & Sá 446 (Leish.)
 Guimarães L. R. 312 (Pl.)
 Guindy 366 (Chl.) 882 (Fev)
 Guinto R. S., with Rodriguez, 238 (Lep.)
 Gunawardana S. A. with Nicholls, 590 (Hel.)
 Gunawardana, S. R., 832 (Hel.)
 Gunther C. E. M., 478 (Fev) 888 (Bl.)
 — & Schroeder A. G. 1000 (Fev)
 Gupta, S. H., with DeMonte 379 (Chl.)

H

- de Haas 51 (Y. & S.)
 — with Eakey 963 (Pl.)
 Hackett, L. W., 678 (Mal.)
 — Russell, P. F., Scharff, J. W. & White, R. S. 620 (Mal.)
 Hakanson, E. G. 302 (Am.)
 Halberstaedter L. 213 (Tryp.)
 Hall, M. C. 425 (Misc.) 848 (Hel.)
 Hamburger F., 846 (Hel.)
 Haman, E. B. & Zurett, S., 101 (Der.)
 Hanasaki, T., 716 (Mal.)
 Hanna, G., with Alport & Ghaloungui 555 (556) (Pel.)
 Hare, C. C. 252 (Hel.)
 Hare K. P., 508 (Misc.)
 Hargett, M. V. 646 (Y.F.)
 Haring, A. T., with Manwell, 588 (Mal.)
 Harley-Mason, R. J. 841 (Hel.)
 Harris, L. J., 558 (Pel.)
 Harrison, G. F. (238) (Lep.)
 Harwood, P. D. with Underwood 840 (Hel.)
 Hasell, P. G., with Weatherbee, 157 (Mal.)
 Hassan, A. 619 (Hel.)
 v. Hasselbach H., with Buhler 715 (Hel.)
 Hasselmann, C. M. 1018 (Lep.)
 Hasseltine, H. E. 692 (Lep.)
 Hasset, C. J., 365 (Chl.)
 Hauer A., 923 (Mal.)
 Hawaii, Territory of, 973 (Pl.)
 Hawking, F. 220 660 671 742 (Tryp) 767 (R.F.)
 Hay G. G. 415 (Misc.)
 Hayashi, F., 531 (Lep.)
 Hazebroek, F. E. A. with Müller & Eased, F. E. A. 99 (Der.)
 Heckenroth, M., 51 (Y. & S.)
 Heggie, J. F., with Stevenson, 252 (Hel.)

- Ferraboe L. Jaimes, C. & Jude A. 1002 (Lenth)
 Ferrari R. C. with I. Ananovich & Br. as 717 (Hel)
 Ferreira, L. C. with Chagas da Cunha Deane L. Deane C. Guimarães on Pannagarten & 54 448 (Lenth)
 — & Deane L. 754 (Tryp)
 — Mangabeira O. Deane L. & Chagas, A. W. 449 (Lenth)
 Ferrer I. 348 (Misc)
 Ferris, H. W. & Turner T. B. 45 47 1 & 5)
 Fester with Gailor & Dubois 698 (Lep)
 Fialbo, A. 507 (Misc)
 Fickler M. 537 538 (Lep)
 Field, J. W. 872 (B.R.)
 — Niven J. C. & Guest (498 Mal)
 Figarella J. with Riquelme & an Pratz, 470 (F)
 Fimbel M. with de S. & Laplanche, 53 (Hel)
 Findlay C. M. 340 (B.R.)
 — & MacF. Dam F. O. 30 635 638 (1 F)
 — & MacF. Dam F. O. 651 (1 F)
 Finlayson M. H. 867 (Vms)
 — & Lerbrier J. M. 881 (Vms)
 — with Shapiro & Saperka 867 (Vms)
 Fink, G. H. 491 (Hel)
 Fitzpatrick F. with Zimmer & Wex, 1002 (F)
 Fitzpatrick F. K. 898 (Fev)
 Flamm S. 723 (Hel)
 Flarer I. 454 (Lenth)
 Fletcher H. 575 (Vms)
 Fletcher A. E. with Jordan, 472, 890 (Fev)
 Fluppen H. F. 474 (Fev)
 Florent, J. with Huber Lefvre & Voret, 123 (B)
 Flosser J. with Loubeyre & Tilber 298 (Am)
 da Fonseca, F. 636 653 (Y.F.)
 — & Artigas, P. 652, 653 (Y.F.)
 Fonseca, R. C. Hoerl P. & Bascuro J. G. 883 (Hel)
 Forkner C. E. with Chas, 417 (Misc)
 Forro, M. with Dubois, 842 (Hel)
 Fort, P. C. L. with Laurens & Bernier 1000 (Fev)
 Foster A. O. & Johnson C. M. 850 (Hel)
 Fourceter M. with Sergeant & Galliano 718 (Hel)
 Fourniale, 216 667 (Tryp)
 Fournier 898 (Fev)
 Fournier J. 602 (Dys) 895 (Chl)
 — with Raynal, 863 616 (Fev)
 Foy, H. with Fauley Brownfield & Rouds, 422 (Misc)
 — & Jorda, A. 121 122 867 (B)
 Fraebel Conrat, H. with Skotta, 855 (Vms)
 Franca, M. with Shannon & Whitman, 27 (1 F)
 Franca, E. 780 (R.F.)
 Franch M. with Costa, Bailemans, Alexa & Mac, 11 (Mal)
 Franks A. G. with Astrachan, 870 (Tryp)
 Fraser G. 422 (Misc)
 Fraser P. K. 104 (Der)
 Frach, M. H. 215, 216 747 (Tryp)
 Freund, L. 41 (Hel)
 Frickers, J. 156 (Hel)
 Friedrich, H. 257 (Hel)
 v. Friedrich, L., 803 (Dys)
 Fröes, H. P. (452) (Lenth)
 Frye, W. W. & McInerney H. C. 293 (Am)
 Fulton, J. D. with Christophers, 340 (Mal)
 Fulton, M. C. with Sydenstricker Schmidt, New & Gesslin, 851 (Pel)
 Fusthy O. 800 (Dys)

D.

- Gabaldón, A. 91 (B.R.) 821 (Mal)
 Gallan, with Joquin, 217 (Tryp)
 Gallan, P. (720) (Hel)
 Galliano, E. J. with Sergeant & Fourceter 718 (Hel)
 Galliard, H. 150 228, (325) 837 843 (Hel)
 Galla-Valerio, B. 603 (Dys)
 Galloway I. A. 165 (Rab)
 Gallot, J. with Bernard & Guillem, 373 818 374 (Chl)
 Gangolli, D. A., (718) (Hel)
 Ganguly R., with Ray 807 818 (Diet)
 Gaona, R. J. with Gatti, 686 (Lep)
 Garcia, R. Y. 126 (Mal)
 — with de Jesus & Jac, 8 (Mal)
 Gardner W. A. & Dexter L., 783 (Mal)
 Garin, C. & Roman, 833 (Hel)
 Garham, P. C. C., 492 (Mal)
 Garrett, E. B., 500 (B)
 Garrison, R. with Castellano, (838) (Pel)
 Gasc, G. 229 (Tryp) 497 (860) (Mal)
 —, with Fagundes, 497 (Mal)
 Gatti, C. Boggino, J. & Prieto, C., 1032 (Lenth)
 — & Gaona, R. J. 686 (Lep)
 Gasse R. with Hillebrand 304 (Am)
 Gaud, 1001 (Fev)
 Gaudichon, A. 291 (Am) (805) (Chl)
 Gaudet, M. with Roussau, 839 1021 (Lep)
 Gaudin Alvarado, E. R. Negri, T. & Mosto 106 (Der)
 Gavrilov W. Bobkoff, G. & Laurens, S. 929 (Mal)
 — Dubois, A. & Fester 698 (Lep)
 — & Laurens, S. 445 (Lenth)
 Gear J. 157 (Misc), 907 (Fev)
 Gear J. H. S. 906 (Fev)
 — & de Meillon, B., 638 (Tryp)
 Gesslin, L. E. with Sydenstricker Schmidt, Fulton & New 351 (Pel)
 German, Q. M. with Tyrer 698 (Dys)
 Gelpert, J., with Spies, Aring & Bean, 553 (Pel)
 Gervay J. 904 (Chl)
 — & Brunson, J. 378 (Chl)
 — & Seyberich, A. 904 (Chl)
 —, Tourmanoff, C. & Hoang Tich-Try 131 (Mal)
 Gentakova, C. J. & Callender G. R., 257 (Mal)
 — with — 679 (Mal)
 Gedach, F. 193 (Rab)
 German, A. & Morvan, A. 496 (Mal)
 Germond, R. C. 254 44 (Lep)
 Germonet, E. with Schwetz, 777 778 (Mal)
 Ghabougn, P. with Alport, (856) (Pel)
 — with — & Hanna, 855 (856) (Pel)

- Ghermani A. with Claudian 546 (Pel.)
 Ghidini G. M. 214 (Tryp.)
 Ghosal S. C., with Lal & Mukherji, 896 (Chl.)
 Ghose A. K., (724) (Hel.)
 Ghosh, B. N., 179 (B.R.)
 — & De, S. S. 836 (Vms.)
 — & Bhattacharya, D. P. 835 (Vms.)
 Ghosh, H. 379 (Chl.)
 Gibbs J. H. 578 (Vms.)
 Gibbins E. G. (843) (Hel.)
 Gibbons, R. J. 474 (Fev) 967 (Pl.)
 Gifford M. A., with Dickson, 507 (Misc.)
 Gigholi, G. 809 (Mal.) 940 (Misc.)
 Gillet, R. (680) (Mal.)
 Gimlette J. D. 432 (B.R.)
 Gioseff M. 347 (Misc.)
 Giovannola, A. (623) (Hel.) 919 930 (Mal.)
 Girard C. 310 (Pl.)
 — & Girard M. 971 (Pl.)
 — & Robie, J. 314 (Pl.)
 Giraud P. & Berger P. 1028 bis (Leish.)
 — Cabasso, H. & Berger P. 1028 (Leish.)
 — & Pomero R., 450 (Leish.)
 Giron P. 982, 983 (Fev)
 — & Panthier R. 984 994 (Fev)
 Giulio R., 35 (Hel.)
 Giunta, B. & d'Ignazio C. 989 (Fev)
 Glotzer S. 115 (Lept.)
 Glover R. E. 725 (Rab.)
 Glueck, H. I. with Rachmilewitz, 552 (Pel.)
 Gmunder E. J. 52 (Y & S)
 Goarman, J. with Lefrou 739 (Tryp.)
 Godal, J. 104 (Der.)
 Gohar M. A. 471 (Fev.)
 Gohar N., 103 (Der.)
 Gornard P., 952 (B.R.)
 de Goldfien, A. S. & de Goldfien J. S. 697 (Lep.)
 Goldman, D. 398 (Mal.)
 Goldstein, F. with Blawell, 1011 (Mal.)
 Gomes, J. M. 99 (Der.) 241 (Lep.)
 Gómez López, L. & Luna, G. 716 (Hel.)
 Gomi, T. with Kubo & Baba, 504 (Misc.)
 Goodman M. H. 349 (Misc.)
 Goodwin, M. H., Jr. with Hull 261 (Mal.)
 Gopull, W. L. 38 841 (Hel.)
 Gorbitz, G. 257 (Mal.)
 Gordon, L. S. with Wright & Boznerach, 848 (Hel.)
 Gordon, R. M. with Davey 582 (Mal.)
 Gore, R. N. 396 (Mal.)
 Goret, P. & Mariette, C. 195 (Rab.)
 Gouget, R., (680) (Mal.)
 Gournon A. F. X., (141) (Mal.)
 Goyal, R. K., with Chopra, Paricha, Lal & Sen, 909 (Diet.)
 Goyle, A. N. 898 (Chl.)
 Gradle, H. S. 457 (Oph.)
 Grant, H. M. with Spies & Huff 557 (Pel.)
 Grant, J. M. with Spies, Stone & Mr Lester 553 (Pel.)
 Grasso R., 303 (Am.)
 Gratch, I. with Negri, (135) (Mal.)
 Grattan, H. W. 365 (Chl.)
 Grazioli, with Huard & Long, 296 (Am.)
 Grecou A. Ionescu, N. G. & Constantinescou, P., 552 (Pel.)
 Green, J. G., 392 (Mal.)
 Green, R. 382 (Chl.)
 Greval S. D. S. Chandra, S. N. & Woodhead L. S. F., 935 (Misc.)
 — Lowe, J. & Bosc R. 537 (Lep.)
 — Sen Gupta P. C. & Napier L. E. 1034 (Leish.)
 Grobler J. M. with Finlayson 861 (Vms.)
 Gross, M. 420 (Misc.)
 Grunels, P. 604 (Dys.)
 Guevov C. with Pavlov 749 (Tryp.)
 Guest, C. 397 (Mal.)
 — with Field & Niven, 498 (Mal.)
 Guilbert, J. & Boscq H. 219 (Tryp.)
 Guillaumou F. with Tasseu 694 (Lep.)
 Guillaume F. 535 (Lep.)
 Guillem J. with Bernard & Gallut, 573 bis 374 (Chl.)
 Guimaraes, F. N. with Chagas, da Cunha, Paumgarten, & Sá 446 (Leish.)
 Guimaraes, L. R. 312 (Pl.)
 Gundy 368 (Chl.) 882 (Fev)
 Guinto R. S. with Rodriguez, 238 (Lep.)
 Gunawardana S. A., with Nicholls, 590 (Hel.)
 Gunewardene S. R., 832 (Hel.)
 Gunther C. E. M. 478 (Fev) 839 (Bl.)
 — & Schroeder A. G. 1000 (Fev)
 Gupta, S. H. with DeMonte 579 (Chl.)
- H.
- do Haas J. (A. & S.)
 — with Eskey 968 (Pl.)
 Hackett, L. W. 676 (Mal.)
 — Russell, P. F. Scharif, J. W. & White R. S. 620 (Mal.)
 Hakanson, E. G. 302 (Am.)
 Halberstaedter L. 213 (Tryp.)
 Hall M. C. 425 (Misc.) 846 (Hel.)
 Hamburger F. 848 (Hel.)
 Hanan E. B. & Zurett, S., 101 (Der.)
 Hanasaki T. 719 (Hel.)
 Hanna, G. with Alport & Ghaliongui, 553 (556) (Pel.)
 Hare C. G. 252 (Hel.)
 Hare K. P. 503 (Misc.)
 Hargett, M. V. 848 (Y.F.)
 Harng, A. T. with Blawell, 588 (Mal.)
 Harley-Mason, R. J. 841 (Hel.)
 Harro, L. J., 556 (Pel.)
 Harrison, G. F. (238) (Lep.)
 Harwood, P. D. with Underwood, 840 (Hel.)
 Hasell, P. G. with Weatherbee, 137 (Mal.)
 Hasnan, A. 619 (Hel.)
 v Hasselbuch, H., with Buhler 715 (Hel.)
 Hasselmann, C. M., 1018 (Lep.)
 Hasseltine, H. E. 692 (Lep.)
 Hassett, C. J., 365 (Chl.)
 Hauser A. 923 (Mal.)
 Hawaii, Territory of 973 (Pl.)
 Hawking, F. 220 690 671 742 (Tryp.) 767 (R.F.)
 Hay G. G. 415 (Misc.)
 Hayashi, F. 531 (Lep.)
 Hazebroek, F. E. A. with Muller & Emsed, F. E. A. 99 (Der.)
 Heckenroth M. 51 (A. & S.)
 Heggis, J. F., with Stevenson, 252 (Hel.)

- Hegner R 495 (Mal)
 — & Eskridge L 336 585 (Mal)
 — & Wolfson F 554 929 (Mal)
 Hedmann R 604 (Dys)
 Heinenmann H 479 (Fev)
 Helman J 158 (Misc)
 Hénaff, with Julliard (996) (Fev)
 Hennessy R S F 949 (Misc)
 Heward, C with van Hooft & Peel 211 (Tryp)
 Henry A F X 141 (886) (Mal)
 Henry C 929 (Mal)
 Henry Lester Institute of Medical Research
 Shanghai, China 704 (B R)
 Hérnanz, A Rocius P & Dao Van Thau, 918 (Mal)
 Herman, C M 237 (Mal)
 Herring A 885 (Fev)
 Hewitt R 336 585 829 1009 1010 (Mal)
 Hignomenaka G h 453 (Leish)
 Hilserty M M with Shartrock, Bequaert, Sandground & Clark 607 (B R)
 Hill R A & Goodwin M H Jr 361 (Mal)
 Hill R B (396) (Mal)
 Hillebrand, P & Garbe R 304 (Am)
 Hilly F with Waiak 403 (Fev)
 Hingst, H E 135 (Mal)
 Hinman, E H 334 (Mal)
 Hitz, S 406 (Fev)
 Hiyada K & Terada, B 717 (Hel)
 Ho C 426 (Misc)
 Ho, E A 1027 (Leish)
 Hoang-Tch-Try with Generey & Tomanoff 131 (Mal)
 Hoare C A 205 (Tryp)
 — & Brown J C 661 (Tryp)
 Hocking, K S with Porter 811 (Mal)
 Hodgson E P (8) (Mal)
 Hodgson C H with Brown 399 (Am)
 — with Poynton 149 639 (Hel)
 Hoekstra M with Schaffner & Walsh-Sorginger 18 25 (Y F)
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 — with — & Chung 1027 (Leish)
 Hoffman S J with Blatt & Schneider 196 (Rab)
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 — with Rodriguez Molina, 40 (Hel)
 Hoffmann, C C (681) (Mal)
 Hoffmann C with Tchutchabane 580 (Mal)
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 Hopman B C 55 (Sp)
 Hopper M E with Lewis & Montgomery 103 (Der)
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 — Pihero, T A Riosha, A A & Rivas, (717) (Hel)
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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

VOL. 36]

NOVEMBER 1939

[SUPPLEMENT

MEDICAL AND SANITARY REPORTS
FROM
BRITISH COLONIES, PROTECTORATES
& DEPENDENCIES FOR THE YEAR 1937
[NINTH ANNUAL ISSUE.]

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Issued under the Direction of the Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES
Keppel Street, London W.C.1

1939

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GEOFFREY EDGAR

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[Supplement to the *Tropical Diseases Bulletin* 1939 November]

YAWS (*Framboesia Tropica*) IN THE BRITISH WEST INDIES

THE CONTENTS OF ANNUAL REPORTS IN 1937

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At a time when the eighteenth century was hurrying to its close and Europe rang with the noises of the great social upheavals which were to introduce a new era in the Political History of the Continent a Spanish epidemiologist was stimulated to embark upon a work of some scientific importance. In this work he promised to discuss the actuating causes of various diseases according to the opinions of medical men who had studied them at different periods of time to present the means which knowledge derived from experience had proved the most efficacious for their prevention or cure and to comment upon the general sanitary measures taken by Governmental and other authorities from time to time in the interests of Public Health.

This admirable intention ultimately gave birth to a treatise entitled *Epidemiologia Española* from the pen of Don Joachim de Villalba and published at Madrid in 1803.

The exuberant title⁽¹⁾ advertising the extensive scope of this work served to excite the scientific appetites of medical investigators of other countries and led them to sample the dish⁽²⁾ prepared by a well-qualified and capable *chef de cuisine épidémiologique*⁽³⁾ who complained that valuable epidemiological studies and vast stores of medical knowledge resulting from the efforts of Spanish investigators throughout the ages were either unknown or purposely neglected by their foreign colleagues⁽⁴⁾.

This reference to the work of VILLALBA has been made because despite the passage of over a century of time the complaint he voiced has a familiar sound. Medical investigators of the present day may be heard resentfully protesting that the results of their work fail to receive the attention their importance merits. Among scientific explorers in this category may be included many Colonial Medical Officers who sometimes feel that their difficult work in remote places receives but scant consideration. They have not been unknown to

(1) *Epidemiologia Española ó Historia Cronológica de las Pestes Contagiosas, Epidemias y Epizootias que han acaído en España desde la venida de los Cartagineses hasta el año 1801. Con noticia de algunas otras enfermedades de esta especie que han sufrido los Españoles en otros Reynos y de los autores nacionales que han escrito sobre esta materia así en la Península como fuera de ella* Joachim de Villalba. 2. Tom. Madrid 1803.

(2) Hecker and others have quoted freely from this work.

(3) Villalba loc. cit. Title-page.

(4) He speaks rather bitterly of the reproaches falling from the lips of the ungrateful foreigner—*¡sufierimos el labio mordido del ingrato extranjero!*—adding that foreign writers failed to consult the medical works of the nation, etc.—*no solo no han consultado las obras medicas de nuestra nacion*—loc. cit. p. x. Intro.

declare that Annual Medical Reports are rarely worth the expense of labour and money devoted to their compilation, since completed documents may serve only to add to the accumulations of printed waste which characterize the dusty shelves of some Government Departments.

These complaints are sufficiently loud, but—so far as Colonial Medical Reports are concerned—are they always just? Certainly it cannot be denied that some Reports receive no more attention than is given them by those, who by virtue of official necessity are compelled to read them. But in such cases can it always be claimed that the fault lies entirely with a vaguely conceived reading Public or is it possible that the indifference complained of may sometimes be due to shortcomings inherent in the Reports themselves? (1)

Regular readers of these *Supplements* will recollect that in earlier issues it was stated that records of sickness were of first-rate epidemiological importance and scientific value (2) and that an attempt would be made each year to select *some disease of outstanding importance in the Colonies and from the Colonial Medical Reports prepare a summary of the varied experiences in different territories etc.* (3) Proceeding to implement the latter intention we hope the discussion which follows will not have proved unsuccessful in persuading the reader to agree that the apparent irrelevancies which have characterized the introductory paragraphs of this essay have some significance.

For purposes of the present summary first this and then that disease title was selected considered and then—for reasons calling for no discussion on the present occasion—discarded. Finally *yaws* was decided upon but owing to limits of time and the exigencies of printed space it was found necessary to confine discussion of the distribution and incidence of the disease to recorded experiences within the boundaries of a single geographical entity. These considerations ultimately led to the choice of the cluster of islands lying between North and South America (including British Honduras in Central America and British Guiana the only British Colony on the mainland of South America) the whole grouped under the embracing title of *The British West Indies*.

An abundant literature evidences the presence of *yaws* in these territories from the time when African slaves were first introduced at the beginning of the 16th century (4). Thenceforward the disease

(1) See *The Contents of Colonial Medical Reports*—P. Grassville Edg. *Trop. Dis. Bull. Supp.* Vol. 23, 1936 pp. 3^a–8.

(2) *Cf. Trop. Dis. Bull. Supp.* 5 pp. Vol. 24, 1937 p. 3^a.

(3) *Cf. Trop. Dis. Bull. Supp.* Vol. 23, 1936 p. 3.

(4) Among other works—*Voyages aux Isles de l'Amérique (Antilles) 1693–1705*—J. Baptiste Labat. Editions Duchesne Paris (2 vols.) 1931 Vol. 2 Chap. IX p. 129.

A Discourse on the State of Health in the Island of Jamaica—Thos. Trapham, London 1679 Chap. 9 pp. 110–128.

1. *Essay on the Most Common West India Diseases*—Dr. Granger London, 1764 Part III pp. 85–89.

Observations on the Changes of the Air and the Concomitant Epidemical Disease in the Island of Barbadoes—Wm. Hillary 2nd Edn. London 1760, p. 339.

Report on Yaws—H. A. Nichols H. V. Stationery Office 1894 pp. 11–13–14.

An admirable bibliography is contained in the monograph *F. Ambrosia Tropica* by E. H. Hermann, Leyden 1931 pp. 153–163.

spread rapidly became endemic in many islands and was the cause of such extensive disability as to give rise to considerable anxiety on the part of the old planters to whom the physical welfare of their slaves was a matter of constant concern (1). Steps were taken to deal with the problem with the result that by stringent segregation and the regular treatment of cases in *yaws houses* (2) conditions underwent such striking improvement that the disease is said to have entirely disappeared from some islands previously heavily infected (3).

However after the emancipation of the slaves in 1834 this system of control came to an end for the negro found himself free to come and go at will. Many of them proceeded to settle in remote or mountainous tracts of the various islands beyond the reach of civilizing influences and the medical treatment of active cases. Infected persons thus acted as foci for the rapid dissemination of the disease which became endemic in some areas and reappeared in several of the islands from which it had formerly been stamped out (4).

From that time forward and until towards the last quarter of the 19th century little seems to have been known of the incidence or distribution of the disease in the West Indian Islands for lacking Governmental care and supervision the negroes appear to have treated themselves or to have sought the doubtful remedies of the native bush-doctor or *obeahman*. During this period *yaws* seems to have disappeared from official records and its very existence was perhaps doubted (5) yet when local Governments were started to realize their responsibilities and began to devote attention to the well being of the people it at once became evident that the evil persisted to a menacing extent was increasing had invaded areas in which previously it was unknown and altogether constituted a serious health problem.

Though steps were thereupon taken to deal with this loathsome contagion with a view to its control and ultimate eradication a number of factors combined to hamper progress. Familiarity with the disease over a long period of time had contrived to make the people lose any fears they may have had of the infection. The belief was well established that infection was inevitable and that the younger the patient the less virulent the course of the disease with the result that contact of healthy with infected persons was actually encouraged. Facilities for proper medical treatment when provided were largely ignored for there had developed a prejudice against treatment by medical officers arising from the belief that only the native bush-doctor and his like understood the nature and cure of the disease. In these circumstances it is scarcely surprising that cases continued

(1) Cf. Nicholls *loc. cit.* pp. 12-14.

History of the West Indies—Bryan Edwards. London 1794.

Reports on Yaws—T. I. Tulloch. (Three issued between 1883 and 1890.)

(2) *Yaws Houses* are described by both Tulloch and Nicholls. There is a "*Yaws Bay*" on Carriacou (an island of the Grenadines attached to Grenada) which may indicate the site of a former *yaws house*.

(3) These were said to include Barbados, Antigua, St. Kitts, Carriacou etc.

(4) Cf. Nicholls, *loc. cit.* pp. 14-15.

A Descriptive Account of Framboesia or Yaws—D. Mason. Edinburgh. *Med. & Surg. Jour.* XXXV. 1831.

(5) Very little if anything was heard of *yaws*, its name even forgotten in some places.—Nicholls, *loc. cit.* p. 14.

to be concealed from professional observation, thus providing scattered reservoirs of infection for the continued spread of the disease.

However efforts on the part of the medical authorities were continued with praiseworthy zeal. Superstitions and beliefs were difficult to overcome but with the gradualness of time more and more people were brought to realize that medical officers did understand the disease and its treatment and could provide relief and cure for sufferers who regularly followed their advice. By the beginning of the 20th century yaws was practically eradicated from many of the islands and in others the number of new cases discovered each year steadily decreased. It seemed reasonable to predict that in a near future complete freedom from the scourge would follow the continuance of these efforts.

Unhappily unforeseen circumstances and conditions of one kind or another arose from time to time demanding the reduction or temporary abandonment of regular treatment services and also it will be remembered that no really efficient means of treating the disease existed prior to the introduction of the Salvarsan compounds and later Bismuth. The malady was thus provided with opportunities for increased spread in some areas, re-infection of others from which it had been eradicated, and introduction of the infection to districts where previously it had not been believed to exist. So for the first thirty years or so of the 20th century the authorities continued an unequal fight hampered by the crippling disadvantages of insufficient funds and shortage of staffs, and experiencing as great difficulty in persuading infected persons to submit to rational and regular treatment, as did their colleagues in pre 20th century days.

And what of the situation in 1937?

With a view to discovering an answer to this question, the Annual Medical Reports for the years 1934-1937 were examined. These Reports deal with health experiences in 17 separate administrative units comprising British Possessions in the West Indies, and having an aggregate population of approximately 2,375,000 persons.

The results of the investigation incline the present writer to observe that accounts as presented in Annual Reports do not adequately represent the scope of work carried out in connexion with yaws in the territories under review. Though it is known that the disease is still the cause of considerable disability in the Islands, with the single exception of Jamaica⁽¹⁾ references to this highly contagious ailment were somewhat scanty. On the other hand it is to be remembered that Annual Reports cannot possibly present all the knowledge of a specific disease assembled by Medical Officers in the course of their year's work. It is not suggested that yaws any more than any other disease, should receive special attention, but it is probably true that the Reports under review do not do justice to the general interest in the specific disease with which this summary is concerned.

(1) In Jamaica through the co-operation of the Rockefeller Foundation a special Yaws Commission was organized in 1931. The yaws problem was dealt with on systematic lines and an admirable series of detailed reports of this work is available (see also pp 7 & 11 *infra*). The Medical Department has now assumed full responsibility for the continuance of the campaign which is effecting steady reduction in the numbers of active and infectious cases.

Facts the only starting point of all epidemiological knowledge are incomplete variously stated in different parts of the same Report or where they are entirely lacking their lack is replaced by the submission of unconvincing personal opinions.

For example as the disease is not mentioned in 6 out of 17 Reports examined, we assume *yaws* does not exist in these areas ⁽¹⁾ In the remaining 11 affected administrative territories 47,862 cases were recorded during 1937 and of this total over 30 000 were recorded in Jamaica the only Colony where an intensive and systematically organized campaign against the disease was being waged. In one Colony where it was observed that *incidence did not vary very much from previous years* almost in the same breath follows the statement that *again it must be recorded that there was an increase in the incidence* ⁽²⁾ In another Colony it was said *The disease is slowly and steadily disappearing* though how slowly or how steadily we are left to conjecture for no record of cases is supplied. In another Colony we are told that 11.6 per cent. of all the diseases in the Districts were cases of *yaws* and then that 1 108 cases were notified only to find in another section of the same Report that 1 611 cases of the disease were dealt with in one District alone Within the boundaries of the same Colony one District Medical Officer will report incidence to be 'decreasing' another that it is 'increasing' ⁽³⁾ while in some areas the inclination lies towards announcing the numbers of injections given during the year in place of the numbers of patients treated

These brief references may suffice to indicate that though for two and a half centuries or so *yaws* has persisted as a significant feature of health experience in the islands comprising the British West Indies it was not possible to discover from Annual Medical Reports in 1937 any dependable numerical expression of collective experience. Precise accuracy is not attainable but there are degrees of inaccuracy and it is suggested that reliable methods of record keeping would provide reasonably complete data for comparative purposes.

Such *aetiological aspects* of the disease as the effects of environmental conditions sex, age or other influences which combine to produce and maintain the infection among the people of certain islands cannot reasonably be discussed at length in Annual Reports unless new facts of outstanding importance have been discovered in any particular year. Whenever possible however it would be of value if records of age and sex incidence ⁽⁴⁾ were provided for diseases responsible for excessive disability. Diseases are not static—the predisposing or contributory factors in various combinations in different areas may profoundly

(1) In the main these areas enjoy relatively dry climatic conditions surface features are characterized by an absence of densely forested mountainous tracts. Cf. *Attitude of the Medical Profession towards Yaws*—C. W. Branch, *Amer Trop Med & Parasit.* Vol. 1 No. 3 Nov 1907 p 405

(2) Actually a 53 per cent. increase over the experience of the preceding year was recorded in 1937

(3) These varied experiences are well known to occur. It would be of interest to be told what probable causes underlie these manifestations.

(4) In one or two Reports Hospital *in-patient* cases are classified by sex alone the numbers of *yaws* cases treated as in-patients are insignificant. Informative Reports were issued by members of the Staff of the *Yaws* Commission of the Rockefeller Foundation among others see—

Age distribution and infection rate in Jamaica—G. M. Saunders and H. Muench. *Amer Jour Hyg.* Vol. 28 1937 pp 423-6.

alter clinical manifestations between place and place and lead workers to record widely divergent conclusions (2) The disease flourishes under conditions of poverty and squalor and is rare among a cleanly people Though not discussed with specific reference to yaws the piecing together of scattered items of information relating to living conditions in areas where cases are recorded, suggests that the whole environment favours the survival and propagation of the causal agents of the disease (3) Reported cases often occur in rural areas where poverty and ignorance are characteristic features, where sanitary conditions are unsatisfactory where there is a lack of control of housing conditions, and where nutritional diseases are common (4) It may be noted that similar conditions exist in greater or lesser degree in some of the Islands from which no cases of yaws are reported

Attempts are rarely made in the Reports under review to discuss the proportions of patients examined showing primary secondary and tertiary stages of the disease including the late tertiary stages characterized by bone lesions and chronic ulcerations. These data are important for comparative purposes it is known for example (not necessarily in the West Indies) that a diagnosis of tertiary yaws is often made on unconfirmed clinical evidence Hospital and dispensary returns suggest that skin and bone diseases, abscesses and ulcers are likely to be more common where yaws is prevalent—though these phenomena may merely reflect methods of hospital book-keeping If each time a patient is treated for the same cause he happens to be recorded as a new case What connexions exist between these manifestations and yaws prevalence are left an open question one such reference only was discoverable in the observation of a District Medical Officer who says

- (1) Sex does not exercise any influence nor does age to any extent — *Manual of Tropical Diseases* Castellani and Chalmers 3rd Edn London 1919 p. 184b

Three males appear to be infected to every one female Two-thirds of the cases in the West Indies occur before puberty so age is exempt. — *Manson's Tropical Diseases* 10th Edn London 1933 p. 878

Le chan est généralement plus fréquent chez la femme que chez l'homme, mais il atteint surtout les enfants Le Chan et sa Ripartition dans les Colonies Françaises — Carton *Bull Off Int d'Hyg Publique* CXLIX, No 3 1937 p. 843

From 5-10 years is the age during which the disease is most likely to occur and From infancy to old age, males are more frequently affected than females — Nicholls, loc cit pp 281-282

- (2) In recent paper for which the Author was awarded the North Borneo Forces Medal for 1938, the relationship of yaws to environment is discussed the following observation also occurs —

Reference is made in Manson's *Tropical Diseases* (1933) to the presence of the spirochaete in the floors and walls of native huts This finding supports the writer's observations for in the West series the primary sore was in most cases situated on the genital regions due, it is thought, to the habits of the unclothed children sitting together on the ground *Yaws and its Treatment* — T Simpson *W African Med Jour* Vol X, No 1 October 1933 pp 17

- (3) Appendix VI of the Supplement to the *British Medical Journal*, June 24th, 1936 records the evidence submitted by the British Medical Association to the Royal Commission on the West Indies discussing the Medical Services in the West Indies In Table II of this Appendix under the title of Diseases possibly indicating Bad Social Conditions are tabulated the available facts called from Annual Medical Reports for 1936 Yaws is one of the diseases recorded and is described as "another prevalent cause of ill-health"

I have no doubt that a fair percentage of the ulcers are *pian* in origin now masked by superadded infections (1)

Open ulcers are especially attractive to flies and as the species *Hippelates pallipes* is commonly met with in the Islands while these insects may play no major rôle in the transmission of infections (2) it is possible they may be to some extent responsible for the propagation of the disease. During 1933 and 1934 the special *Yaws Commission* of the Rockefeller Foundation working in Jamaica undertook special entomological studies concerned with the anatomy physiology and life habits of *Hippelates* flies with results which tended to show that *H. pallipes* might be the natural vector of *yaws* (3). Admittedly these views are at present conjectural but research work is usually prompted by guessing at the causes of phenomena and competent workers are of the opinion that this aspect of the *yaws* problem is worthy of further study (4).

(1) Observation by the District Medical Officer No 3 District, St. Lucia.—*Annual Medical and Sanitary Report St. Lucia, 1937* p 13

(2) Cf. Mechanical transmission of trypanosomiasis leishmaniasis and yaws through the agency of non-biting hematophagous flies.—J Gordon Thomson and W. A. Lamborn *Brit. Med. Jour.* Vol. 2, p 508, September 1934

Experimental transmission to man of *Treponema pertenue* by the fly *Musca sorbens*.—W. A. Lamborn. *Jour. Trop. Med.* Vol. 39 pp 235-239 Oct. 1936

Framboesia tropica.—A short review of a Colonial Report concerning statistics and *Hippelates flavipes*.—L. Nicholls. *Ann. Trop. Med.* Vol. 30 pp. 333-334 Oct. 1936

Sambon having observed the great prevalence of small gnats of the genus *Hippelates* in Jamaica, suggested that they as well as other winged insects might act as mechanical transmitters of the virus.—J. F. Siler in *Amer. Jour. Trop. Dis. & Prev. Med.* Vol. III, pp 443-445

Any influence which unhygienic conditions may exert on which flies such as *Hippelates pallipes* may have in the dissemination of the disease can occur only in areas with a tropical, humid climate.—H. D. Chambers. *Trans. Roy. Soc. Trop. Med. & Hyg.* Vol. XXXI, No 4 Jan. 1939 p 451

The literature contains frequent references to flies and yaws e.g. —

It is caught also by a singular species of inoculation which is performed by a little fly.—*A Comprehensive Treatise of Venereal and Syphilitic Diseases*—F. Swediaur (English Trans.) London 1821 pp 299-300

Cf. also *An Essay on the Natural History of British Guiana*—E. Bancroft, London 1768 p 335

The Medical Assistant or Jamaica Practice of Physics.—Thos. Dancer 3rd Edn. London 1819 pp 222-226

Entomological Studies for the Jamaica Yaws Commission during 1934.—H. W. Kumm. *Annual Report Medical Department for 1934* Part II, p 9. Published Kingston, Jamaica, 1935

(3) The Duration of Motility of the Spirochaetes of Yaws in a small West Indian fly—*Hippelates pallipes* Loew.—H. W. Kumm, T. B. Turner and A. A. Peat. *Amer. Jour. Trop. Med.* 15 pp 209-223 March 1935
The Digestive Mechanism of one of the West Indian eye gnats *Hippelates pallipes* Loew.—H. W. Kumm. *Ann. Trop. Med.* 29 pp. 283-298, Oct. 1935

Natural Infection of *Hippelates pallipes* Loew with spirochaetes of yaws.—H. W. Kumm. *Trans. Roy. Soc. Trop. Med. & Hyg.* 29 pp. 265-272, November 1935

(4) For example A house fly a species of *Musca* is very common. This fly as a result of its regurgitant habits may be a factor in carrying the infection to non-specific sores and wounds of otherwise healthy individuals. It is hoped at a later date to be able to study this phenomena in some detail.—Simpson. *loc cit* p. 17

Under the title of *Treatment* Reporting Officers confine their remarks to such statements as "bismuth is the drug of choice, that "injections of arsenic or bismuth were given" or that "treatment was continued on the same lines". As regards the latter phrase the same statement was found to have been repeated previously in five successive Annual Reports relating to one Colony. These matters received the studied attention of the *Yaws Commission* of the Rockefeller Foundation during the course of their investigations in Jamaica, and several valuable reports were issued describing their findings in great detail.⁽¹⁾

But in this connexion it is well to bear in mind that the limited space available in Annual Reports makes it impossible to discuss within their pages such matters as the successive dosages of drugs used during the course of treatment, their graduation with respect to the age of patients, the preparation of bismuth or arsenic used, the average numbers of injections necessary to effect cure, the intervals of time between successive injections, disagreeable after-effects, if any, or intolerance to specific drugs and so on. Information on these points is usually reserved for publication in special reports, scientific journals, etc. though so far as *yaws* is concerned, such papers are by no means abundant. It would be a useful feature of Annual Reports if brief mention could be made of published papers, or of any work in progress designed to extend the boundaries of existing knowledge. There is little doubt that given the opportunity Medical Officers with extended experience of *yaws* in the West Indies would have much of interest and scientific value to say of the rapidity with which lesions clear up as the result of specific therapeutic action and modes of administration of various drugs, of the proportion of relapses occurring among cases previously treated, of *yaws* patients suffering from some concurrent disease demanding two forms of treatment and thus complicating the difficulties of assessing the results of treatment for *yaws* alone. The importance of these matters is recognized by all Colonial Medical Authorities and from time to time results are discussed in the pages of this or that scientific journal. But would not a useful purpose be served if it was found possible to make brief mention in Annual Reports of the more important items of information recorded by Medical Officers whose valuable work does not always receive the attention it deserves?

If results of treatment are systematically checked by serological examinations such results should be recorded in Annual Reports. Facilities for such work are not at present available in many of the Islands. Lacking adequate laboratory equipment and trained technicians it becomes impossible to determine how many injections of a specific drug are necessary to produce unmistakable Wassermann or Kahn negative reactions, and what proportion of cases if any show positive reactions after a full course of treatment. Here again reference must be made to the valuable comparative studies on the

(1) Cf. *Yaws in Jamaica*—A plan of control based on Treatment.—H. M. Johnston and G. M. Saunders. *Amer Jour Hyg* Vol 91 pp 522-559 May 1935

Yaws, Jamaica—Epidemiological Study by T. B. Turner and G. M. Saunders. *Amer Jour Hyg* Vol 1 pp 453-621 May 1935

Control of Yaws by alternate treatment method—G. M. Saunders. *Amer Jour Trop Med* Vol 17 pp 335-347 May 1937

relationship of *yaws* and *syphilis* carried out by the *Yaws Commission* of the Rockefeller Foundation in Jamaica results being discussed in the Report of the *Yaws Commission* for 1934 and in various scientific journals.⁽¹⁾

As regards *research work* the responsible Medical Authorities in these Islands are eager and ready to undertake and continue with schemes of research which would serve to extend the enquiries so admirably planned and carried out in Jamaica by the *Yaws Commission* of the Rockefeller Foundation but unfortunately research work is costly and financial considerations have up to the present prohibited resumption of these investigations on a large scale. So far as the British West Indies are concerned research work is usually regarded as being confined to the valuable investigations of various kinds which have so long been carried out in the established laboratories of Jamaica and Trinidad. But on the other hand though lacking laboratory equipment and trained *personnel* for the purpose Medical Officers in many of the smaller Islands have often and voluntarily undertaken and successfully carried out original enquiries concerned with public health problems peculiar to their respective areas.

Unfortunately what work of this kind is, or has been done or what special knowledge has been accumulated during the course of independent enquiries is not always nor adequately reported either in Annual Reports or in Medical Journals. Furthermore many Medical Officers must assemble during the course of extended field experience information of value which however they may modestly regard as too insignificant to merit separate publication. The bare mention of some of these items of knowledge in Annual Reports would be of value to other workers.

Admittedly a great deal of knowledge has been accumulated concerning *yaws* but it cannot be denied that much yet remains to be known before it can be claimed that certainty has replaced conjecture in so far as certain features of the disease are concerned. It is not within the scope of this paper to suggest lines of research but there can be no doubt that *field observations constitute an essential part of such work* and these are constantly being made. So far as Annual Reports are concerned it is believed they provide a readily accessible medium for the recording of such observations which otherwise may pass unnoted. For example it is by no means impossible that minor but important points in the *field* application of recognized methods of diagnosis, treatment etc. may be found by extended practical experience to need modification. Such modifications suggested by field workers might well be mentioned in Annual Reports.

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- (1) *Relationship between yaws and syphilis* —T. B. Turner *Amer Jour Hyg* Vol 25 pp 477-506 May 1937
Comparative histology of yaws and syphilis in Jamaica —H. W. Ferris and T. B. Turner *Arch Path* Vol 24 pp 703-737 Dec 1937
Comparisons of cutaneous lesions produced in rabbits by intracutaneous inoculation of spirochaetes from yaws and syphilis —H. W. Ferris and T. B. Turner *Arch Path* 26. pp 491-500 Aug 1938
Resistance of yaws and syphilis patients to re-inoculation with yaws spirochaetes —T. B. Turner *Amer Jour Hyg* 23 pp 431-448 May 1936
 The following paper published by a Medical Officer in Jamaica —
Further light on the yaws syphilis problem. —H. D. Chambers. *Trans Roy Soc Trop Med & Hyg* 31 pp 245-250. July 1937

Reports relating to different Colonies the textual comments of some contributors are little more than the repetition of the same verbal descriptions from year to year. The annual submission of snippets of comment concerning a wide range of individual diseases or attenuated references to important medical activities are practices which scarcely possess any scientific value. Out of a wealth of experience little real information is released, and as matters stand at present the success of measures adopted in one Colony may be for want of knowledge of the relevant information may not be made available either in scientific journals or in Annual Reports.

The reader may be reminded that in the introductory pages of this essay reference was made to complaints that Annual Reports were often received with indifference(?) and it was hoped that discussion might reveal some of the causes contributing to the apparent unpopularity which clings to this branch of official literature.

Certainly the aim of the *Model Medical and Sanitary Report* was to provide for the preparation of readable Reports of an informative nature and not to create static conditions so far as these Reports are concerned. But some Reporting Officers appear to have defeated this aim by the development of dreary routine methods of work, followed from year to year rather reminiscent of Macaulay's description of Mohère's doctors(?) who thought it more honourable to fail according to routine than to succeed by innovation. (?)

- (1) Cf. p. 4 supra
(2) *Critical and Historical Essay* by Lord Macaulay—London 1877 War of the Spanish Succession p. 259

(3) In *Le Malade Imaginaire* M. Diafoirus, physician is pressing the claims of his son Thomas Diafoirus (also a physician) for the hand of Angélique the daughter of Argan (*Le Malade Imaginaire*) and quotes in his son's favour —
ce que me plaît en lui, et en quoi il suit mon exemple, c'est qu'il attache vigilement aux opinions de nos ancêtres, et que jamais il n'a voulu comprendre ni écouter les raisons et les expériences des prétendues découvertes de notre siècle — Cf. *Le Malade Imaginaire* Act 2. Sc. V. p. 355

and again—
et pourvu l'on suive le courant des règles de l'art, on ne se met point en peine de tout ce qui peut arriver. Loc. cit. p. 358

The Third Interlude to the play describes the burlesque ceremony representing the admission of a candidate to the degree of Doctor of Medicine. This is composed in a mixture of dog-Latin and French and is scarcely translatable in any modern fashion it tells how the candidate is required to swear to follow all the ancient practices and remedies of the Faculty — Cf. *Le Malade Imaginaire* Tome neuvième Œuvres de Molière Libraire Hachette. Paris 1886

In much the same sense Buckle observes —

By encouraging the notion that all the truths most important to know are already known they repress those aspirations, and dull that generous confidence in the future without which nothing really great can be achieved. A people who regard the past with too watchful an eye, will never bestir themselves to help the onward progress. T. them antiquity is synonymous with wisdom and every improvement is a dangerous innovation — *History of Civilization* England by H. T. Buckle London 1881 Vol. 2 p. 595

MEDICAL AND SANITARY REPORTS FROM BRITISH COLONIES, PROTECTORATES AND DEPENDENCIES FOR THE YEAR 1937

[NINTH ANNUAL ISSUE]

Summarized by P. GRANVILLE EDGE.

WEST AFRICA

COLONY AND PROTECTORATE OF NIGERIA (1937)

The Colony and Protectorate of Nigeria is the largest of the British West African possessions its approximate area including the area of the Cameroons under British Mandate being 372 674 sq miles, or more than three times that of the United Kingdom. It is bounded on the west and north by French territories, on the north-east by Lake Chad on the east by the Cameroons and on the south by the Gulf of Guinea.

Vital Statistics—The townships of Aba and Enugu are now registration areas and together with Lagos and Ebutte Metta in the Colony Calabar Port Harcourt and Kano in the Protectorate are the only areas in Nigeria where registration is compulsory (see this *Bulletin* 1938 Supp p 19*) Attempts are being made to record births and deaths in several areas under Native Administration control but in many cases the figures are at present of little value. In this connexion the Report observes: The movement of population between the towns is so great and the growth of the larger towns so rapid that many of the residents do not belong by birth [to such towns?] and the age distribution consequently shows a peak in the middle years. In addition people return to their birthplaces if possible to give birth to their children and also when sickness overtakes them [Query: Would it not be possible under the regulations governing registration to provide for the transfer of records of births to areas of habitual residence of parents of newly-born children and deaths to place of habitual residence of decedents?]

Population figures for Nigeria as a whole are not given in the Report under review (see this *Bulletin* 1938 Supp p 19*)

The relevant facts assembled from the registration areas mentioned above read as follows:—

Registration Area	Estimated Population	Birth Rate	Death Rate	Infant Mortality Rate
<i>The Colony</i>				
†Lagos and Ebutte Metta	155 800	22.9	23.3	130
Enugu	14,541	20.0	19.7	312
Aba	9 152	31.5	18.8	187
<i>The Protectorate</i>				
Port Harcourt	20 000	10.6	9.9	235
Kano	8 710	12.6	25.0	180
Calabar	18,000	27.2	20.2	67
Ijebu Province	333 000	36.0	27.0	—

† In a separate Report, the *Annual Report of the Medical Officer of Health Lagos* detailed information is supplied.

In Lagos 88.6 per cent. of all deaths are certified by medical practitioners in Port Harcourt 73 per cent. in Aba 61 per cent. in Kano 59 per cent. in Enugu 49 per cent. and in Calabar 38 per cent.

At the Government Laboratory Lagos, an investigation was commenced into the causes of death in African children up to three years of age. Post mortem examination was made of all children whose deaths were not medically certified. The investigation promises to yield useful information with regard to the incidence of malaria and the pneumonias with respect to age, climatic conditions, etc.

European Officials resident numbered 2,131 with an average number resident of 1,520. Of these 106 were invalided and 6 died. Twenty-four per cent. of the cases of invaliding were due to *neurasthenia*, 7.6 per cent. to *asthenia* and 5.7 per cent. to *malaria*. Of the deaths 2 were due to *yellow fever* and 1 to *blackwater fever*.

Twenty-nine deaths were recorded among non-native non-officials and of these 4 were due to *yellow fever*, 4 to *malaria* and 1 to *blackwater fever*.

The number of African Officials resident is not stated, but 18 were invalided and 32 died during the year. The principal causes of invaliding were *defective vision* 16 per cent. and *neurasthenia* 11 per cent. and of the deaths 20 per cent. were due to *nephritis*, 20 per cent. to *pneumonia* and 10 per cent. to *pulmonary tuberculosis*.

The average daily strength of the Nigeria Regiment (African R W A F F) was 3,082. Of these 23 were invalided and 21 died. The average daily strength of the Nigeria Police (Africans) was 3,429. 25 were invalided and 42 died.

Maternity and Child Welfare Work—Activities continued to expand (see this Bulletin 1938 Supp. p. 20*). A total of 2,331 normal deliveries was recorded in Government and Native Administration hospitals and maternity centres as compared with 1,893 in the preceding year. Infant Welfare Clinics continued to function at a number of medical stations. In Lagos 188 clinics were held during the year and 3,697 infants recorded 8,806 attendances. Health Visitors paid 41,836 domiciliary visits during the year. According to the Report under review the various Religious Missions maintained 71 Maternity and Child Welfare Centres, 39 of these being established in the Northern Provinces. [This suggests some curtailment of these activities for in the 1936 Report there were 116 such centres with 77 of them in the Northern Provinces.]

At the end of the year there were 83 midwives registered under the Midwives Ordinance, 35 of them in possession of the Grade I Certificate. Four certificates as Grade I midwives, and 23 as Grade II were granted during 1937.

School Hygiene—There is no mention of any organized School Medical Service (see this Bulletin 1938, Supp. p. 21*). Close co-operation is maintained with the Department of Education in connexion with the hygiene of schools and health education. In Lagos a school clinic is maintained and in the Northern Provinces the periodical examination of school-children has been carried out in certain areas, but no details of these activities are supplied. Conditions are said to vary between wide limits in the various schools reported upon by Medical Officers. The following extracts relate to two schools in the Northern Provinces.

Medical Officer Idah Kabba Province reports.—‘The only important school in the District is at Dekina. The general lay-out is satisfactory. It is a fine example of what can be done by a willing body of men. Any minor complaints are dealt with at the Native Administration Dispensary situated close at hand. The school consists of well fitted and lighted buildings. The whole area is a sanitary delight.’

Medical Officer Pankshin Plateau Province observes — There are two elementary schools and about a dozen Mission schools. Latrines and other sanitary facilities are the exception. The latrines at Pankshin School are in ruins.

Public Health Sanitation etc—The sanctioned establishment of the Department was increased by 5 medical Officers of Health, 2 African Medical Officers, 2 Nursing Sisters and 7 Sanitary Superintendents while additions were also made to subordinate personnel grades. These increases enabled the posting of a Medical Officer of Health to the Cameroons and the provision of personnel for the sanitary control of aerodromes in Nigeria. *Anti malarial* measures continued along lines previously described (see this *Bulletin* 1938 Supp p 21*-22*). Larvicidal work against *A. gambiae* and *A. furestus* was carried out to the limit of available funds. *Yellow fever* control work demanded and received special attention. The routine inspection of premises for the control of domestic mosquito-breeding was continued and in certain areas a campaign was carried out against water bearing plants which are potential mosquito-breeding foci. The anti-mosquito measures carried out by the Lagos Town Council were particularly thorough and praiseworthy; the larval index dropped from 9.8 in June to 0.7 in August. Supplementing previous descriptions of methods of *sewage disposal* (see this *Bulletin* 1934 Supp p 5*, 1935 Supp p 6*, 1936 Supp p 10*, 1937 Supp p 15* and 1938 Supp p 22*) the Report under review observes that the use of latrines has continued to advance gradually but that a large proportion of the population of Nigeria continue to pollute the ground by indiscriminate defaecation. Tribes living in the vicinity of creeks, lagoons etc. have continued to make use of such waters for the direct disposal of night soil. In some places latrines built over the water are in use but in limited areas the practice results in the accumulation of offensive waste matter. The *salga* or cesspit is in common use in many towns and villages, especially in Northern Nigeria. Bore-hole latrines on the other hand have not been tried on a sufficiently wide scale though in many areas ground conditions are suitable. Pipe-borne water supplies provided by Government and Native Administrations are available in a number of areas in both the Northern and Southern Provinces but not in all cases have supplies been submitted to purification treatment. It was decided that for the future all pipe-borne public supplies constructed by Government should be potable and unlikely to be the carrier of any form of disease. In the Northern Provinces the Geological Department provided additional wells in the Emirates of Hadzima, Katsina, Katagum and Visau.

With regard to *labour conditions* it is noted that as a result of discussions an extensive building programme has been drawn up

Cots	In-patients		Out patients	
	Admitted	Treated	Died	Treated
of well	1,325	1,355	23	5,366
stary delig				
Pankshin	26,616	27,723	3,209	147,543
other sanitary fac	31,281	33,203		504,454
Pankshin School are in				

Health Sanitation etc. - daily number of prisoners was
 Department was increased by the sick list of 72 during the
 in Medical Officers 2 Nurses recorded.

These increases enabled the - administrative Dispensaries were
 to the Cameroons and the were 322 new such Dispensaries
 any control of aerodromes in patients were treated. The
 continued along lines previously - Dispensaries in o
 up p 21*-22*) Larvicultural work - quarters provided for medical
 carried out to the limit of avail - from local materials by local
 work demanded and received - simple models of a - accommodation
 premises for the control of de - holders in the area.

continued and in certain areas a - of Religious Missions in the
 water-bearing plants which are po - 5 dispensaries are maintained.
 he anti-mosquito measures carried - totals and 43 dispensaries. The
 ere particularly thorough and 56,961 cases were dealt with at
 topped from 9.8 in June to 0.7 in 34,976 in the Southern Provinces.
 scriptions of methods of - he commonest causes of sickness
 app p 5* 1935 Supp p 6* - patients were for Europeans
 P 15* and 1938 Supp p 22*) - diseases and bronchitis and among
 that the use of latrines has continu - miasma etc. diseases referred
 P - a large proportion of the population. The following notes briefly
 an ground b indiscriminate - extended references to morbidity
 nativity of creeks lagoons etc - review

appliers for the direct disposal of - of hospital returns there were 1,279
 over the water are in use - deaths and 14 cases of blackwater
 in the accumulation of - cases and non Europeans there were
 spit is in common use - deaths and 10 cases of blackwater fever
 in the Northern Nigeria. Bore-ho - of types of infection among n and
 ed on a sufficiently vi -

inventions are suitable. P
 fected - and Native Adm.
 The - both the Northern

On	Deaths	In patients	Non Europeans	
			Deaths	Deaths
supplies been s	3	—	63	—
at for the future	18	—	49	—
and Yankin should	681	2	1,493	—
alt with d	227	1	1,031	8
hang - provided	—	—	—	19,969
Table the	—	—	—	—
a - accommodation	5	2	13	—

At the various Laboratories in Nigeria (see *Scientific* below) 14,245 blood films were examined for the presence of malaria parasites: positive findings recorded were *P. falciparum* 3,853 *P. malariae* 14, and *P. vivax* 3. Crescents were present in 24 films examined.

Of *Yellow fever* 18 cases with 11 deaths were recorded among Europeans and 10 cases with 4 deaths among Africans. The first outbreak occurred in May at an American Mission at Ogbomoso in Oyo Province and the disease appeared later in 12 other centres in the Northern and Southern Provinces. It is of interest to note that of the 18 European cases 11 occurred on Mission compounds where Europeans and Africans live in close proximity: 3 occurred in European officials (one wife) on tour where no adequate separation of rest-houses from native habitations is normally found, and the remaining 4 were associated with residence in commercial compounds. No infection has ever been reported to have taken place in a residential area.

A high *Aedes* index was always associated with the outbreaks, but it is noteworthy that the larger towns, where mosquito control measures are vigorously applied, remained free from the disease (see also *Public Health* above). An unusually large number of protection tests and tissue section examinations were performed by the Laboratory Service for purposes of diagnosis. Protective inoculation with a vaccine supplied by the Wellcome Bureau, of persons likely to be exposed to the risk of yellow fever was undertaken experimentally in Lagos, and investigations were made into cases of post inoculation jaundice. A notice issued by the Department and widely circulated urged all Europeans to undergo protective inoculation: the response was very good.

Smallpox was again prevalent and particularly severe in the Northern Provinces as may be gathered from the following summary of reported cases and deaths:—

	Cases	Deaths
The Colony	18	—
Southern Provinces	564	85
Northern Provinces	3 085	436

Routine vaccination was continued by Government and Native Administration Vaccinators and intensive campaigns were organized in epidemic areas: altogether 38,336 vaccinations were performed in the Colony 395,324 in the Southern Provinces and 477,962 in the Northern Provinces. After several years of experimental work the Laboratory Service has perfected its methods for the preparation of a satisfactory vaccinia vaccine, and has entered on the preliminary stages of large-scale production.

No case of *plague* human or rodent was notified during the year. In December an outbreak of a disease resembling bubonic plague was reported north of Zinder (in the French Colony of the Niger). Immediate steps were taken to prevent entry of the infection into the Northern Provinces but later investigations failed to prove that the outbreak was due to plague.

An extensive epidemic of *cerebrospinal fever* of unusual severity raged in the north of Nigeria from January to May and was responsible

for 2,823 deaths in a total of known cases of 3,452. It is doubtful whether all cases were reported while on the other hand deaths due to other causes may have been attributed to the disease during the period of the outbreak. The usual control measures were applied and with the arrival of the rains the number of cases rapidly diminished. Serum tests made after recovery proved the occurrence of *typhus fever* in two Europeans in Kano and one in Gboko (Benue Province).

The text of the Report mentions only 12 reported cases of *enteric fever* with 5 deaths whereas hospital returns show 23 cases of typhoid 2 of paratyphoid A 3 of paratyphoid B and 2 cases in which the type of infection is not defined of these totals 22 cases of typhoid occurred among non Europeans with 4 deaths. At the Laboratory 67 sera were tested 19 were positive and 8 doubtful. No details as to types of organism isolated are supplied.

In and out patients treated for *dysentery* totalled 6,337 with 147 deaths distributed as follows —

	Amoebic	Bacillary	Unspecified	Deaths
Europeans	66	15	30	—
Non Europeans	3,222	113	2,891	147

At the various Laboratories where 12,634 specimens of faeces were examined 558 were found to contain *E. histolytica*. In addition 183 faecal specimens were cultured and the following organisms isolated *B. dysenteriae* Flexner 46 times Shiga 9 Schmitz 2 and Newcastle 1.

Trypanosomiasis—Treatment alone or treatment combined with minor measures of tsetse control have failed to stem the advance of the disease into new areas and the situation in the Northern Territories has for some years been the cause of much anxiety. To deal with the problem the Deputy Director of the Sleeping Sickness Service prepared a comprehensive scheme. In an Appendix to the Report under review this scheme is described in detail but for the purposes of the present summary it will suffice to say that the plan provides for the recruitment of additional personnel the removal of hamlets and re-settlement of the people in clean or protected areas where seed land wells and other necessities will be provided for the settlers. *The Sleeping Sickness Ordinance* 1937 was enacted early in the year to provide powers to enable the scheme to be put into operation the Colonial Development Fund is providing £19,000 per annum for the work on the understanding that the Nigeria Government provides an additional annual contribution of £11,000. By October 1937 most of the European personnel had been recruited.

Meanwhile during 1937 five Sleeping Sickness Teams continued to carry on with the usual field work. 447,358 people were examined 29,011 were found to be infected and 28,426 had completed treatment by the end of the year.

The Special Sleeping Sickness Scheme and Annual Report should be read in its entirety its contents describe such matters as research work (much restricted owing to shortage of staff) entomological investigations therapeutic measures and control work the re-settlement schemes etc.

Tuberculosis—Hospital returns show there were 17 European cases of *pulmonary tuberculosis* with 1 death and 3 cases of other forms of the disease with 1 death among non-Europeans there were 1 041 cases of the pulmonary form of the disease with 177 deaths and 530 cases of other forms of tuberculosis with 33 deaths. In Lagos alone 246 deaths were ascribed to tuberculosis and of these 173 were pulmonary. Though the disease has been added to the list of compulsory notifiable diseases (see this *Bulletin* 1838 Supp. p. 26*) no mention of the numbers of cases reported during 1837 is made. Plans have been made for the erection of a small tuberculosis ward at Yaba a suburb of Lagos.

At the Laboratory work was continued on the study of types of strains of the tubercle bacillus isolated from varying clinical types of cases. Seventeen strains were forwarded to Dr A. S. GRIFFITH who typed them as follows, *Eurotic human* 8 *Dysotic human* 10 and *Bovine* 1. Samples of sputum examined numbered 1,834 and of these 281 were positive with *Mycobacterium tuberculosis*.

The Report observes that *pneumonia* "may be roughly calculated to account for 25-33 per cent of all native deaths." In- and out-patients (non-European) treated at hospitals for this cause totalled 3 186 and of these 841 died. There were also 50 624 non-European cases of *bronchitis* with 87 deaths.

Of *helminthic* diseases it is said that *ascariasis* is more common in the Southern Provinces and *taeniasis* in the Northern Provinces. The following figures appear in the hospital returns of in- and out-patients of cases dealt with during the year —

Item	Europeans	Non-Europeans
Ascariasis	10	26,170
Taeniasis	28	6,823
Ankylostomiasis	6	2 251
Dracontiasis	1	2,543
Filaria (F. bancrofti)	1	—
(Leech)	39	736
Schistosomiasis (haematobium)	1	1 167
(malinensis)	2	314

The relative incidence of *helminthic* infestation in the Municipal Area of Lagos may be gathered from the fact that among 4,531 faecal specimens examined at the Laboratory the ova of *Ascaris* were found in 2,588 *Trichuris* 1,995 *Ancylostoma* 1 754 *S. mansoni* 30, and *S. haematobium* 2 while among 4 401 specimens of urine *S. haematobium* was found in 178 cases. Our Station Laboratories reported the examination of 8 153 specimens of stools, and among these the ova of *Ancylostoma* were found in 3,305 *Trichuris* 1,281 *Ascaris* 927 and *S. mansoni* 85 among 8 473 specimens of urine *S. haematobium* was found in 414.

Leprosy—In the Northern Provinces there are 11 and in the Southern Provinces 8, *Leprosy Settlements* supported by Native Administrations. The policy of handing over the management of the Native Administrations Settlements to Medical Missions was continued approximately 5 673 lepers are resident in the various settlements.

A number of leprosy surveys were made by the Superintendents of certain settlements, and by the British Empire Leprosy Relief Association doctors while anti leprosy work is gradually being developed along the lines recommended by Dr Muir.

Venereal Diseases—The numbers of patients treated for *sypilis* and *gonorrhoea* in hospitals and dispensaries were 19 155 and 17 074 respectively. there were also 1 482 cases of *soft chancre* and 621 of *venereal bubo*. Among 3 569 samples of serum submitted to Kahn test at the Lagos Laboratory 1 491 gave positive reactions and among 275 smears 71 were positive with *N gonorrhoeae*.

Yaws is one of the most prevalent diseases in the Eastern part of the Southern Provinces and attains its highest incidence in the Cameroons where in villages remote from medical centres it chiefly affects children in the 2-5 age-group though its after-effects often persist throughout life. It is said that the employment of village *chindas* (see this *Bulletin* 1937 Supp. p. 19*) to administer injections has done little if anything to reduce the incidence of the disease. During the year an Ordinance was introduced amending the Medical Practitioners and Dentists Ordinance to regularize the practice of the administration of injections (for *sypilis* yaws sleeping sickness etc.) by unqualified persons. this Ordinance empowers the Director of Medical Services to license suitable persons to administer injections. During the year 90 225 persons were treated at hospitals and dispensaries.

Eighteen non Europeans received hospital treatment for *rabies* and 2 died but in addition 380 persons were given specific treatment for exposure to *rabies* infection. The dog was the infecting animal in all cases but one where the patient had been bitten by a cat. At the Laboratory out of 66 brains examined 33 were positive with *Neeri* bodies—32 dogs and 1 cat.

Ulcers were responsible for the treatment of 57,500 non European patients at hospitals and dispensaries, *rheumatism* for 42,367 and *eye diseases* for 19 561.

Scientific—Under this heading can be included a reference to the year's work at the Schools of Medicine and Pharmacy which forms the subject of a special report in the Annual Report under review. *The School of Medicine Yaba* provides a four years course of training leading to the Certificate of Medical Assistant. For the various examinations in 1937 the following results were recorded —

Examination	Medical Assistant's Certificates		Diploma Examination	
	Candidates	Successful	Candidates	Successful
January Section (i)	3	3	—	—
Section (ii)	15	7	—	—
June Section (i)	3	3	—	—
December	—	—	6 All	referred

Professor W. W. JAMESON, Dean of the London School of Hygiene and Tropical Medicine visited the School in November and formally opened the new physiology block which will accommodate 18 students.

At the *School of Pharmacy* at the beginning of the year there were 19 students and in April 13 new students were admitted 2 of whom were women. One student passed the Dispenser's Qualifying Examination Part I four Part II and 12 the Chemists' and Druggists' Examination.

During 1937 the Laboratory Service consisted of (a) The Office and Laboratory of the Senior Pathologist at Yaba (b) A Bacteriological Unit in charge of a Pathologist at Yaba (c) The Laboratory of the African Hospital Lagos in charge of a Pathologist (d) Clinical Laboratories at six centres five of them staffed by African Laboratory Assistants.

The Report of the Laboratory Service appears as an Appendix to the Annual Report under review. The principal specimens received and findings recorded have already been the subject of brief reference in the preceding notes under such headings as *yellow fever*, *tuberculosis*, *smallpox* etc. Another piece of interesting work is worthy of mention.

Having regard to the theory outlined by F. W. CLEMENTS in the *Medical Journal of Australia* that the mouth is the source of origin of the spirochaetes and fusiform bacilli found in tropical ulcers and abrasions may arise through the accidental inoculation of abrasions with expectorated material smeared from the gums of 58 labourers in Lagos were examined. In 43 cases the smears were found to harbour numerous spirochaetes and fusiform bacilli, there being no evidence of pyorrhoea or other infection of teeth or gums. Material from the gums of four heavily infected labourers were inoculated with nutrient broth and 7 African volunteers were pooled, diluted the mixture. In every case small ulcers resulted but the spirochaetes and fusiform bacilli disappeared in the course of a few days and no lesion of the characteristic tropical ulcer type resulted. The conclusion finally reached was one of doubt that the source of tropical ulcer infections in Nigeria is oral.

Financial.—Actual expenditure on Medical Services in Nigeria during 1937-38 amounted to £462,630.

GOLD COAST COLONY (1937)

The Gold Coast Colony with Ashanti, the Protected Northern Territories and Togoland under British Mandate is situated on the Gulf of Guinea. It is bounded on the west by the French colony of the Ivory Coast, on the east by the French Mandated Togoland, on the north by the colony of the Upper Volta and on the south by the sea. The area of the Colony is 23,937 sq miles, of Ashanti 24,379 of the Northern Territories 50,486 and Togoland 13,041 the total being 91,843 sq miles.

Vital Statistics.—The estimated population figures for the middle of the year under review read as follows—

Item	Gold Coast and Dependencies	Togoland	Totals
Africans	3 340,581	359 754	3 700,335
Non Africans	3 139	43	3 182
Totals	3 343 720	359 797	3 703,517

[With regard to the figures for Non Africans (3 182) in another section of the Report the resident European population is given as 4 791 and in yet another place as 3 890]

For the 35 established registration areas (see this *Bulletin* 1938 Supp p 29*) the relevant vital facts read as follows —

Mid Year Population	Registered Births	Birth Rate	Registered Deaths	Death Rate
333 159	11,234	33.7	8 431	25.3

In these areas birth rates range from 9.7 to 78.5 per 1 000 and death rates from 12.7 to 70.8 per 1 000. The averages for some of these well-sanitated registration centres do not reflect the health condition of the resident population in those areas for they are affected to no little extent by conditions prevailing in poorly sanitated areas surrounding them. Furthermore mortality rates are greatly influenced by the high mortality rate characterizing the 25-45 age-group of immigrant labourers this group usually provides in a population healthy male adults in the highest productive stages of life.

The General European population in 1937 totalled 3,890 persons and of these 100 were invalided and 25 died during the year.

European Officials resident numbered 901 with an average number resident of 632. Forty-eight were invalided and 7 died. Of the invalidings 12 were due to purely tropical conditions and of the deaths 1 only (yellow fever).

African Officials resident numbered 3,962 with an average number resident of 3 750. Within this group 22 invalidings and 26 deaths were recorded—6 of the deaths due to yellow fever.

Maternity and Child Welfare Work—The volume of work dealt with at established centres may be summarized as below (p.28*)

It must be remembered that in addition to provision made at the Accra and Kumasi centres welfare activities are carried out as part of the routine services provided at all Government Hospitals and Dispensaries. These important services are apt to be overlooked and in this connexion it may be mentioned that 6 900 cases of children alone were dealt with during the year at Out patient Departments.

During the year under review 647 patients were treated in the maternity wards of the Princess Marie Louise Welfare Centre at Accra and 522 in the welfare centre at Kumasi.

Nine midwives and 20 subsidized midwives figure on the staff of the Health Branch and these women conducted 2,554 deliveries. The local native midwife is rapidly losing ground now that more trained midwives are becoming available and as the services of the latter are becoming increasingly appreciated. The sphere of usefulness of these

women could be greatly extended if Native Administrations could be persuaded to provide the cost of subsidies for midwives working in their respective areas

Authority and Centre	Attendances	
	Expectant Mothers	Children
<i>GOVERNMENT</i>		
Accra	1,074	70,179
Kumasi	1,489	13,653
Totals	13,563	33,832
<i>R.N.C.</i>		
Cape Coast	5,087	9,414
Sekondi and Shama	5,248	9,383
Tuandua	9,772	21,345
Totals	70,108	40,14
<i>Missionaries</i>		
Dordre (Roman Catholic)	187	3,195
Eikwa	—	50,828
Kpand	792	31,545
Amedrope (Bremen Mission)	19	1,332
Totals	993	86,800

The usual *Annual Report of the Maternity Hospital Accra*, appears as an Appendix to the Report under review and describes the year's work in considerable detail. Owing to steadily increasing demands there is need for a new Out-patient Block, a larger Normal Labour Ward, and extensions to the Isolation and Ante-Natal Wards. Of the 1,376 patients admitted during the year 642 were labour cases and 553 women were admitted for ante-natal treatment. 838 live births, 73 infant deaths and 35 maternal deaths were recorded. Among out-patients there were 3,590 ante-natal and 963 post-natal cases.

At the *Maternity Training School* the increasing number of applicants seeking training indicates that midwifery as a career for the African educated young woman maintains its popularity. Under training during the year were 6 second Division Nurses, 3 Nurses-in-Training, 24 Pupil-midwives and 18 Probationers commenced their studies. Eleven midwives received the Certificate of the Central Midwives Board.

School Hygiene—No school service in the true sense exists and there is little if anything to add to former commentaries (see this *Bulletin* 1936 Supp. p. 18*, 1937 Supp. p. 22* and 1938 Supp. pp. 30*-31). Hygiene continues to be taught in all Gold Coast schools and great weight is attached to this subject on visits of inspection by officers of the Education Department. It is felt that much valuable information is being lost through the failure to establish a regular School Medical Service, but shortage of staff makes this impossible at present.

Public Health Sanitation etc.—The improvement in the general health recorded during 1936 (see this *Bulletin* 1938 Supp. p. 31) suffered a set-back during the year under review. Increased mortalities due to non-tuberculous diseases of the respiratory system and diseases

of the intestinal tract (influenced by abnormal drought conditions in some areas) were mainly responsible. Anti-malarial activities continued to be carried out to the limit of funds and staff available and most stations report progress in this field of work. It is pointed out that in many areas the greater part of funds and labour are required for the maintenance of existing drainage systems. With regard to anti-yellow fever measures (see this Bulletin 1938 Supp pp 34-35) it is stated that satisfactory mosquito control over rural areas is not possible large areas are closed books—local outbreaks may occur but not be reported by responsible Chiefs. The value of protective inoculation to Europeans of all classes is continually emphasized.

Under the heading of sewage disposal it is observed that in the Northern Territories a simple type of septic tank latrine has been evolved for use in rural areas. The water-carriage method of drawn and when composted with organic household refuse the final has a high manurial value. The water-carriage septic tank method of disposal from bungalow properties steadily advances but the final disposal of the effluent gives rise to anxiety in some areas. The central congested areas of the larger centres of population call for the provision of water-carriage sewer borne systems but water is not yet available in sufficient quantity to permit consideration of such schemes. Large rural areas are without sanitary and adequate pit latrine accommodation nor do means exist of bringing pressure to bear upon Chiefs that such provision should be made. Meanwhile until the decision is taken as to whether indirect rule or direct rule methods shall govern sanitation standards decline village surroundings continue to be excreta soaked and anxieties increase.

The investigations of the Public Works and Geological Departments into the water supplies in the Northern Territories have already resulted in the establishment of supplies in certain seriously affected areas. Improvements to the water supplies in various villages in Ashanti and the Colony were carried out during the year and work was commenced at the Accra Water works on the installation of additional plant capable of increasing output to 2 000 000 gallons.

Sanitation in the Mining Areas is discussed in forming an Appendix a Report contributed by Dr H P FOWLER and forming an Appendix to the Annual Report under review. The population concerned comprises 601 Europeans and 20 351 African labourers. In areas actually controlled by mining companies good progress is reported—there is continued improvement in the type of latrine employed and septic tank installations are being introduced in increasing numbers in European bungalows. Many mines have piped water supplies to their mine villages. But in districts surrounding the above areas masses of insanitary hovels have sprung up and here until new legislation can be enforced little improvement can be expected. In the section where Labour Conditions are discussed it is observed that large influx of potential labour into the Gold Coast from neighbouring territories continued over 38 000 persons were disinfecting at the station near Kumasi as against 22 978 in 1936. Many of the newly arrived immigrant labourers are in poor physical condition and a considerable percentage of them diseased (see also this Bulletin 1938 Supp p 32*)

Progress in connexion with *housing and town planning* schemes in most of the larger centres of population is reported. On the other hand there is urgent need for attention to be devoted to the clearance of slum areas in some towns. In Accra, it is estimated that one-tenth of the people live under insanitary and overcrowded conditions.

Food in relation to Health and Disease is discussed and mention made of the unbalanced nature of the average Gold Coast dietary (see this *Bulletin* 1938 Supp. p. 32*). Foodstuffs, markets, bakeries etc., continue to be inspected regularly in centres where Health Staffs are stationed.

The Central School for the *training of Sanitary Inspectors* continued to function throughout the year with an average of 20 men in training. *Village overseers* continue to be trained at Kumasi. It is hoped to establish a school for Native Administration village overseers at Tamale (Northern Territories).

Recommendations for future work include the provision of water supplies for certain districts, water borne sewage disposal for Accra and Kumasi, slum clearance in Accra, provision of infectious diseases hospital and quarantine station at Takoradi, and staff increases of one Assistant Director of Health, two Sanitary Superintendents, and three Health Visitors.

Port Health Work—Accra (town and port) was placed in quarantine on two occasions during the year owing to outbreaks of yellow fever. At Accra 614 ships entered and 7 147 immigrants and deck passengers were appropriately dealt with. At Takoradi ships entering numbered 784 and immigrants and deck passengers 8,929. No plague infected rat was caught at any of the Gold Coast ports during the year. Work proceeds on the *anti-malarial aerodromes* at Accra and Takoradi. The Accra aerodrome is in regular use but so far passenger traffic has been slight.

Hospitals, Dispensaries, etc.—Work on a new hospital at Cape Coast was commenced during the year and progress is reported in connexion with the new Infectious Diseases Block in course of construction at the Gold Coast Hospital, Accra. The distribution of the 7 European and 41 African hospitals and bed accommodation at these institutions, and Dispensaries established throughout the Gold Coast is as follows:—

Locality	European Hospitals		African Hospitals		Dispensaries Number of
	Number	Beds	Number	Beds	
Eastern Province	1	18	21	491	13
Central	1	6	8	148	7
Western	2	77	4	119	6
Ashanti	1	12	4	211	4
Northern Territories	1	6	6	145	8
Total d	—	—	2	41	3
Contagious Diseases Hospitals	6	68	32	1 165	41
	1	4	9	168	—
Totals	7	72	41	1,321	41

29* GOLD COAST COLONY (1937)

At these institutions 28 237 in-patients were treated 2 247 died and 301 855 out patient cases were dealt with For three centres only are in patients classified with distinction as to race viz —

	In-patients Treated		
	Europeans	Africans	Totals
	408 473 241	3 073 1 612 3 371	3 481 2 085 3 612

Accra
Sekondi and Takoradi
Kumasi

In addition to the 41 Dispensaries mentioned above 5 more are in course of construction at 21 of the dispensaries conducted by African staffs 52 078 out patients were treated during the year

In Mining Areas seven of the many Companies have their own full time Medical Officers with satisfactory medical and sanitary personnel on six of the mines adequate hospital accommodation is provided for African employees and five of them provide separate hospital accommodation for Europeans. The mines without resident Medical Officers have fairly well equipped dispensaries and dressing stations

Welfare work undertaken by Missions has been mentioned in the preceding notes it remains to say that the only hospital (General?) maintained by a Mission is that of the Basel Mission Hospital at Agogo in Ashanti. At this centre work steadily increases year by year during the year under review 1 408 in-patients and 7 368 out patients were treated.

The scheme of Government Medical Scholarships introduced in 1931 for the purpose of enabling suitable Africans to qualify in medicine in the United Kingdom continued to function A scholar was selected during 1937 and there are now two students engaged on preliminary studies at Achumota College and three making satisfactory progress in England. In April 1937 the Secretary of State approved the institution of Government Dental Scholarships in the interests of suitable Africans. Two scholars will be selected in 1938

The text of the Annual Report under review provides an account of the factors affecting the public health and discussion of the principal items of morbidity experience during 1937 The notes which follow briefly summarize some of the more important references to these matters.

Malaria continues to be the most important factor adversely affecting the public health infection can be considered almost universal and every pathological condition throughout life is complicated by it During 1937 there was a marked increase in the number of cases treated 30 581 as against 25 130 in the preceding year Of the 30 581 cases 2 483 were treated as in-patients and 76 of them died among them were 14 cases of blackwater fever with 5 deaths. The distribution of types of infection among all cases recorded was benign tertian 443 quartan 67 subtertian 18 685 malarial cachexia 269 blackwater fever 20 and unclassified 11 092 cases The scheme for the distribution of quinine through the Post Offices

continued to function with conspicuous success sales increased by approximately 100 per cent (see this *Bulletin* 1937 Supp p 25*) At the Accra Laboratory where 4 684 blood films were examined, 1 786 were found to contain malaria parasites types of plasmodium are not differentiated

The year under review was the worst yellow fever year since 1927 The virulence of the infection was unusually severe 69 deaths occurring amongst the 75 cases recorded most of the Africans who died did so on or about the fifth day of the disease In the area chiefly affected—the southern portion of the Eastern Province to the north and north-east of Accra—the rains were deficient and late this led to extensive storage of water invariably unprotected, in houses in the backwarrural districts Satisfactory control in such areas is not at present possible Of the cases and deaths recorded 72 cases and 67 deaths occurred in the Colony these comprised one fatal European case four fatal Syrian cases and the remainder were Africans Three cases and two deaths occurred in the Northern Territories one being a fatal European case

In centres where control measures were possible the usual house-to-house inspections were carried out over 2,600 000 visits were made to premises and an average Aedes index of 0.5 recorded.

The Report of the Senior Pathologist gives a detailed account of the pathological findings in the 67 fatal cases recorded in the Colony a noteworthy feature was the frequency with which intranuclear cell inclusions were seen A number of photomicrographs in black and white and in colour of livers from cases of yellow fever are reproduced The possibility of an extension of yellow fever beyond the West African endemic area by means of the rapidly increasing number of trade land routes is discussed it is a matter of economic difficulty for the machinery of prevention to keep pace with these rapid developments The value and importance of protective inoculation is emphasized

No case of cholera or of relapsing fever was recorded. With regard to the latter disease it is noted that 22,378 immigrants were dealt with at the de-lousing station near Kumasi Smallpox was responsible for 43 cases with 2 deaths 343 193 persons were vaccinated While no case of plague was reported, nor were any rats bacteriologically examined found to be infected with *P. pestis* the disease constitutes a direct threat and may force an entry into the Gold Coast as it has done in the past Much rat-proofing remains to be done and the slum areas in the vicinity of the port at Accra demand urgent attention. One fatal case of cerebrospinal meningitis is mentioned

Cases of typhosomiasis treated in hospital dispensaries and camps during the year numbered 5 162 with 156 deaths, while 175 deaths were attributed to this cause in the whole of the Gold Coast The most seriously affected areas were the north-eastern and north-western parts of the Northern Territories where 2 750 and 1 423 cases respectively were recorded The survey mentioned in the 1936 Report (see this *Bulletin* 1936, Supp p 35) was organized and work commenced during the latter half of the year the results of this investigation will be presented in due course At the Accra Laboratory among 4 684 blood films examined 12 were found to contain trypanosomes

While *enteric fever* does not loom largely as a killing disease it is believed to be much more common than recorded cases and deaths would suggest. During the year 129 cases were reported and 29 deaths were registered as due to this cause. Hospital in patients numbered 100 distributed as to 85 typhoid 8 paratyphoid A 1 paratyphoid C and 6 undefined cases. The Report observes that incidence is likely to increase in the larger population centres where insanitary conservancy systems and unwholesome drainage systems contribute to the spread of infection. Diseases of the dysentery diarrhoea and enteritis group moved from third to second place in the list of killing diseases largely due to the drought conditions experienced in many areas during the year. Here again incidence is highest in areas where insanitary conservancy conditions and questionable water supplies are found. It is said that as a rule the amoebic form of the disease is twice as common as the bacillary. Among 487 hospital in patients (57 died) 294 were amoebic cases 133 were bacillary and 1623 out patients. Among 2,571 stools microscopically examined at the Laboratory E histolytica were found 822 221 and 580 respectively. Among 2,571 stools microscopically examined at the Laboratory E histolytica were found 68 times and among 333 faecal specimens bacteriologically examined, *Bact dysenteriae* Flexner was isolated 40 times Shiga 3 times and Schmitz 7 times. Hospital in patients treated for diarrhoea and enteritis numbered 510 (49 deaths) and out patients 5,582 of the latter 2,314 were children under two years of age. According to findings recorded at the Laboratory the serum of 3-4 per cent of Africans and Europeans contained agglutinins for *Bact. enteritidis*.

As a single disease entity *tuberculosis* heads the list of fatal diseases while the *pulmonary* form claims over 90 per cent of the total deaths due to all forms of tuberculosis. Approximately 49 per cent of all deaths ascribed to pulmonary tuberculosis occurred in the male 25-45 age-group—this group comprising practically the whole wave of immigrant labour (see also *Vital Statistics* above and this Bulletin 1938 Supp. p. 36*). The deep-mining industry certainly affects the picture. The mine-worker is free to come and go as he pleases in becoming aware of his condition he usually sets out for his home and in most instances has ceased to be a miner before death supervenes. The effects of underground mining on the health of Africans is briefly referred to in a special report contributed by Dr H. P. FOWLER, who observes that at present reliable data relating to the incidence of tuberculosis and silicosis are not available. An investigation is to be undertaken by expert officers who will have a radiological unit at their disposal. Among 477 hospital in patient cases of all forms of tuberculosis with 222 deaths 413 of the cases and 207 of the deaths were due to the pulmonary form of the disease. Among 908 out patient cases 783 were cases of pneumonia were treated and 1,394 deaths under review 2,114 cases of pneumonia were treated and 1,394 deaths were registered as due to this cause. Here again males in the vulnerable 20-45 age-group contribute the largest number of cases and deaths. Bronchitis was responsible for 399 in-patient and 14,793 out patient cases.

Helminthic Diseases—The following figures taken from the Hospital Returns summarize cases dealt with during 1937 —

Diseases	In-patients	Hospital Deaths	Out-patients
Taeniasis	95	2	2,315
Ascariasis	148	2	1,532
Ancylostomiasis	434	18	1,037
Dracontiasis	227	1	973
Schistosomiasis	143	10	710

Ancylostomiasis and *ascariasis* are common in rural areas where sanitary latrine accommodation is lacking *taeniasis* in areas where fuel shortage makes the cooking of meat adequately a difficult matter *Dracontiasis* is common outside the larger population centres in areas where clean water supplies are lacking *Schistosomiasis* is said to be more widely distributed than is generally supposed the condition is frequently ignored by the sufferer and only discovered during a general routine medical examination

Leprosy.—At the Leper Settlements at Ho Kumasi, Yendi, Sekondi, and Accra, 572 inmates were under treatment of this total 410 patients were treated at the Ho Settlement It is generally believed that there are some 7,500 lepers in the Gold Coast incidence is lowest in the South and increases progressively from South to North. An account of the year's work at the Ho Leper Settlement is contributed by Dr G L ALEXANDER Medical Officer in Charge During the year 64 new cases were admitted, 38 old cases re-admitted, 39 absconded, 15 died, and at the end of the year there remained 268 patients under treatment. Two out of four nasal smears examined at the Laboratory were positive with *Mycro lepro*

General diseases.—The following Table summarizes cases dealt with during the year —

Disease	In patients	Out patients
Syphilis	122	734
Soft Chancres	91	898
Gonorrhoea	371	4,162
Gonorrhoea Venereum	8	9

At the Venereal Diseases Clinic of the Gold Coast Hospital, Accra new patients numbered 653 and attendances 15,439 At all centres the proportion of gonorrhoea cases exceeded those of syphilis During the year 83,684 cases of yaws were dealt with (see this *Bulletin* 1938, Supp. p. 37*) and of this total 5,220 cases were seen at Infant Welfare Centres The distribution of the disease is curious On the western side of the Northern Territories yaws was responsible for 63 per cent. of all cases seen at Bawku in the north-eastern corner of the Northern Territories only 8.5 per cent. of all cases were yaws, but further south in the villages served by the Yendi Hospital, the proportion was over 90 per cent The campaign against the disease continues.

Out of 3,095 samples of serum submitted to Wassermann test, 1,333 or 43 per cent. gave positive reactions Organisms morphologically indistinguishable from gonococci were found in 231 (46 per cent.) of 610 smears examined at the Laboratory

Scientific—The usual record of the year's routine work is supplied the more important of the specimens examined and findings recorded have already been subjects of brief mention in the preceding notes. *Research work* was mainly concerned with the yellow fever outbreak during the year—the summary notes describing the outbreak contain a reference to the Report of the Senior Pathologist in this connexion (see yellow fever above).

The *Annual Report of the Analytical Chemist* observes that 2 182 specimens of various kinds were dealt with during the year 1 595 samples being received for examination from the Customs Department. Included as *Appendices* to the *Annual Report* under review are the following reports on interesting cases—

- (a) PURCELL F. V. *Primary acute carcinomatosis of the liver*
- (b) — *Cerebello-pontine Tumour Syndrome (acoustic neuroma)*
- (c) MACRAE A. V. *Yellow Fever with Filariasis simulating an acute abdominal emergency*
- (d) — *Sub-acute Yellow Atrophy of Liver occurring during the Yellow Fever epidemic*

and in addition to the above—

- (1) The *Annual Report of the Leper Settlement* Ho
 - (2) The *Annual Report of the Maternity Hospital* Accra.
 - (3) *Annual Report (Health Branch) on the Western Province*
- particular reference to the Mining Areas.

Financial—Actual expenditure on Medical Services during 1937 amounted to £339 721 a sum which represents 12·6 per cent of the total expenditure of the Colony during the same year

SIERRA LEONE (1937)

The Colony and Protectorate of Sierra Leone has an area of nearly 28 000 sq miles a little less than that of Scotland. The sea coast is 210 miles long and extends from Kairaba on the border of French Guinea to the Mano River on the Border of the Republic of Liberia.

Vital Statistics—The system of registration organization and executive staff remain as previously described (see this *Bulletin* 1938 Supp. p 33*) no new registries were opened during 1937. Although the Colony is well served with registries for Freetown alone are data regarded as dependable in the Protectorate figures are far from complete. The recorded facts supplied by the Chief Registrar read as follows—

Area	Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I M R.
The Colony	104 822	2 408	22·9	2 568	24·5	593	246
Freetown	63 758	1 344	21·0	1 459	22·8	377	243
The Protectorate	1 672,058†	1 843	?	565	?	80	?

† Census figure 1931

Having regard to the difficulties attending registration efforts, Dr W P H LIGHTBODY the Chief Registrar is able to supply an admirable series of tabulations. Births deaths and infant deaths are classified with distinction as to sex for all Registration Districts in the Colony and Protectorate for Freetown deaths are classified by cause infant deaths by cause and in various age-groups.

European Officials resident numbered 227 with an average number resident of 167. Thirteen were invalided and one died. Of European non-officials there were 565 resident with an average number resident of 416. Among this group 19 were invalided and 1 died.

There were 984 African Officials resident with an average number resident of 931. thirteen were invalided and four died.

The average strength of African Troops (R.W.A.F.F.) was 375. During the year 184 men were on the sick list and 1 died. The total strength of the African Police was 271. 170 were on the sick list during the year and 1 died.

Maternity and Child Welfare Work—Steady progress was maintained in maternity services and during the year 537 cases were admitted to the Maternity Ward of the Connaught Hospital, 393 were delivered of their babies, and 5 maternal deaths were recorded. The new *Maternity Training Centre* in course of erection approaches completion.

The voluntary training of midwives continues to make satisfactory progress. 5 pupils are undergoing training and 5 obtained the C.M.B. certificate in 1937.

There were 830 new cases entered on the registers of the *Ante-natal Clinic* Freetown and 6414 attendances were recorded during the year while at the *Post-natal Clinic* 459 new cases were dealt with and 1173 attendances recorded (see also this *Bulletin* 1938 Supp p 39*). It is said the clinics in the out-stations are becoming increasingly popular.

Infant Welfare Clinics are now held three times a week at the Maternity Centre Freetown and are well attended. 511 cases were on the registers and 13060 attendances recorded. *Health Visitors* attached to the Clinic paid 9,325 visits to 782 newly-born babies.

In addition to the above services, maternity and child welfare work is carried out at the various *Mission Hospitals* with success. The work of the Princess Christian Mission Hospital (in the Colony) maintains a very high standard while at clinics at the Mission Hospitals in the Protectorate work has reached a high standard and is increasing daily.

The annual Health and Baby Week was an unqualified success.

School Hygiene—Systematic medical inspection of school-children was not possible owing to shortage of staff, but a special survey of a number of Protectorate schools was carried out during the early summer. 23 schools were visited and out of 1,806 children on the registers 1,444 were examined and individual records of age sex height weight tribe and other details inscribed. Of the total children examined 14.3 per cent of the boys and 18.5 per cent of the girls were judged to be of poor physique the majority of these under 10 years of age. Poor physical development was rarely seen in children of 14 years or over. The average spleen rate was 55.6 per cent, the rates ranging from 11.6 to 85.0 per cent. No case of scurvy beriberi, or pellagra was seen.

Public Health Sanitation etc—The health of the Colony and Protectorate during 1937 is said to have been fairly satisfactory. *Anti malarial* and *Anti Yellow Fever Measures* which for many years to come will prove a major activity of the Health Branch were continued along lines previously described. These matters are as usual discussed in the Report in great detail. Mosquito control in the Protectorate deserves more attention than it has so far received owing to lack of staff and funds but it is hoped that organized control work may be started in the near future.

Methods of *sewage disposal* remain unchanged. The question of a modern water borne sewage system for Freetown is a matter demanding the earnest consideration of Government. In the Protectorate pit latrines continue in general use it is considered that bore-hole latrines might be tried in areas where the soil is suitable. Methods of *refuse disposal* also remain as previously described. (For further descriptions see this *Bulletin* 1935 Supp p 25* and 1937 Supp p 30*.)

The various *water supplies* were maintained as usual throughout the year. The Freetown supply gives cause for considerable anxiety and has for some time shown definite signs of pollution. bacteriological examination of the water confirms this. Pending the installation of a chloramine sterilizing plant the public have been warned to boil all drinking water. The Waterworks Engineer contributes a brief report for the year under review. None of the supplies in the Protectorate can be regarded as satisfactory and many of them are inadequate as to quantity.

Housing and Town Planning conditions remain as described in this *Bulletin* 1937 Supp p 30*.

With regard to *labour conditions* housing is receiving increased attention and the general sanitary condition of the lines in the diamond mining area is said to be on the whole very satisfactory. in the alluvial gold mining areas less progress in regard to these matters can be recorded. Regulations governing the minimum basic requirements for the housing of native labour are under consideration.

The courses of *training of sanitary personnel* were continued as usual. In 1938 three British Sanitary Superintendents will be permanently stationed in the Protectorate where they will exercise a stricter control over the routine work of the African Sanitary Inspectors.

A *Health Week* was organized in all Medical Officers Stations in the Protectorate. reports indicate that these events have become increasingly popular.

Port Health Work—Increase in shipping activity is reported. 968 ships entered the port of Freetown. 1495 deck passengers and 20230 Krio boys embarked and 1798 deck passengers and 21715 Krio boys disembarked. During the year 4,373 Krio boys and 887 deck passengers were vaccinated.

The Medical Officer (Health) Freetown is at present also Port Health Officer. An additional Medical Officer for Port work is urgently needed.

Hospitals Dispensaries etc—A new European Hospital is in course of erection. An additional Protectorate-type hospital was erected at Kailahun. There was a further increase in the numbers of patients.

attending hospitals for treatment, but subsequent attendances show a falling off. Including the Lunatic Asylum Infirmary Leper Asylum and Hospital for Infectious diseases, there are 15 Government Hospitals for the accommodation of African patients.

There are 8 Government Dispensaries in the Colony and 14 in the Protectorate. 2 new dispensaries are in course of construction.

There are four Mission Hospitals subsidized by Government, and three hospitals maintained by Mining Companies.

Details of hospital accommodation patients treated, etc. during the year under review may be summarized as follows —

Hospitals	Beds	In-patients	Deaths	Out patients
1 European	14	174	4	306
15 African	854	8,273	385	115,717
8 Mission	98	1,578	7	31,894
3 Mining Companies	No details supplied			

The principal diseases treated at hospitals and dispensaries during 1937 included bronchitis 13,709 cases, malaria 10,232 (includes 11 cases of blackwater fever), rheumatism 9,497, yaws 9,312, constipation 8,649, wounds and injuries 7,770, venereal diseases 3,738 cases.

Malaria caused the deaths of one European and seven Africans and blackwater fever one European and seven African deaths also. The distribution of types of infection with distinction as to race can be summarized in the following manner —

Race	Benign tertian	Quartan	Subtertian	Cachexia	Undefined	Blackwater Fever
European	4	4	70	—	41	3
African	55	103	761	61	9,122	8

Among the above cases there were 83 European and 408 African in-patients.

Preventive measures against malaria have been the subject of brief mention in the section *Public Health* above, but it remains to add that the distribution of quinine through the agency of Political Officers and Post Offices was continued on a satisfactory basis throughout the year.

At the Laboratory where 2,550 blood films were examined, 709 were malarial infections, 193 quartan, 1 benign tertian and 37 were mixed subtertian and quartan infections.

Though many cases of yellow fever were reported in neighbouring Colonies, Sierra Leone remained free from the infection. The vigilance exercised on visiting ships, crews and passengers was of an exacting nature, and was successful in preventing introduction of the disease.

Sporadic cases of smallpox were reported but preventive measures taken early controlled the spread of the disease. In the Colony 31 cases

and 1 death in Free town 9 cases and 1 death were notified and in the Protectorate 103 non fatal cases were recorded. During the year 37,952 vaccinations were performed.

Eleven cases of *typhus fever* were reported. At the Laboratory agglutination tests were applied to 123 samples of serum 12 of them yielding titres considerable above normal. Typhus was definitely diagnosed in 10 cases seven being of the "X 19" type and three of the indeterminate or "X 2" type. The remaining two cases though agglutinating OXh to a high titre did not exhibit a clinical condition resembling typhus nor was the characteristic rise and fall of the agglutination titre observed over a period. As has been previously suggested (see this *Bulletin* 1938 Supp. p. 42*) these results tend to confirm the fact that two forms of the typhus group exist among the population.

No case of *plague cerebrospinal meningitis relapsing fever* or *rabies* was reported. During the year 3,463 rats were examined for *P. pestis* but all gave negative results. The flea index was 1.8 and the *X. cheopis* index 0.37.

Thirteen cases of *typhoid fever* were notified. 5 of the cases were imported. Hospital Returns show three European in-patient cases of typhoid and one case in which infection was undefined, and one out-patient case. Among natives there were 10 in-patient cases with 2 deaths and 7 cases among out-patients. Reported cases of *dysentery* numbered 462. One European case was treated in hospital for *amoebic dysentery* and there were 2 out-patient cases of *bacillary dysentery* and one in which the type of infection was not defined. Among African in-patients there were 75 cases of *amoebic* 2 of *bacillary dysentery* and 18 undefined cases the corresponding figures for out-patients being 179 7 and 77 respectively. At the Laboratory where 1,848 faecal specimens were examined 30 were positive with *E. histolytica* (free) and 10 with *E. histolytica* (cysts).

Tuberculosis—In one section of the Report it is stated that 2 cases were reported amongst Europeans and among Africans 182 cases with 26 deaths. The classified Hospital Returns show two European cases (one an in-patient) and among Africans a total of 197 cases. Of the latter 73 were treated as in-patients with 27 deaths 55 of the cases and 24 of the deaths being ascribed to the *pulmonary* form of the disease. Among the 124 African out-patient cases 106 were suffering from *pulmonary tuberculosis*. In Free town alone 77 cases were notified during the year but it is surmised many more people suffered from *pulmonary tuberculosis* than were notified. In Free town *tuberculosis* is now the third most important cause of death.

A marked increase in the number of cases of *avitaminosis* is reported, viz. 2,186 as compared with 999 in the preceding year. The whole question of nutrition is receiving the attention of Government and a Central Nutrition Committee has been formed (see also this *Bulletin* 1938 Supp. p. 43*).

Helminthic Diseases—During the year 5,889 cases of *ascariasis* 395 of *ankylostomiasis* 274 of *trichuriasis* and 72 of *schistosomiasis* were dealt with. At the Laboratory where 1,848 faecal specimens were examined 489 contained *ankylostome* ova, 417 *Ascaris* 139 *Trichuris* and only 1 *S. mansoni*.

Venereal Diseases.—A decrease in the number of cases of syphilis and an increase in gonorrhoea cases is reported. 3 174 cases of the latter and 566 cases of the former were recorded. At the Venereal Diseases Clinic, Freetown, 680 cases were dealt with gonococcal infections accounting for approximately 70 per cent of the total. During the year 9 312 cases of sores were treated. A special survey is in progress with a view to ascertaining whether a mass attack by means of arsenicals should be instituted in the Protectorate.

Other diseases referred to in the Report under review include the following. Of *leprosy* 126 cases with 1 death were reported. No cases of *antrax* among Europeans were recorded, but there were 49 African cases with 10 deaths. Although a slight decrease in the number of cases of *chronic rheumatism* is recorded 9 497 cases were treated during the year. Five non-fatal cases of *trypanosomiasis* were reported.

In addition to the *Laboratory Report* (see below) a number of detailed *Special Reports* are presented in the Annual Medical Report. These include (a) the Report of the *Kissy Lunatic Asylum* (b) *Freetown Prison* (c) Report of the *Surgical Specialist*, Connaught Hospital (d) *Maternity and Child Welfare Work* (e) *Eye Clinic* and (f) Report of the *I. D. Clinic*.

Scientific.—The Report of the Pathologist incorporates all work performed in the Connaught Hospital Laboratory and also those examinations carried out by the Sir Alfred Jones Research Laboratory (see this *Bulletin* 1938 Supp. p. 42* and 44*). The principal specimens examined and findings recorded have been the subject of brief reference in various sections of this summary.

Financial.—Total expenditure on Medical and Sanitary Services during 1937 amounted to £72,783 of which £52,121 represented Medical and £20 662 Sanitary expenditure.

COLONY OF THE GAMBIA (1937)

The Colony of the Gambia was created in 1843 previously from 1807 having been under the Government of Sierra Leone, and was constituted a separate government 45 years later in 1888. It now consists of the island of St. Mary (on which is Bathurst, the seat of Government), British Kumbo, Alfreeda, the Ceded Mile, the territories of Brefet and Bajana and MacCarthy Island. This last forms the line of demarcation between the Upper and Lower portions of the Gambia River. The total area of the Colony and Protectorate is 4 132 sq. miles.

Vital Statistics.—Attention continues to be drawn to the fact that the estimated population is a doubtful figure and must remain erroneous until the next general census is carried out. The available vital statistical facts relate to Bathurst and read as follows.—

Item	Africans	Europeans and Whites
Estimated population	14 097	232
Births recorded	370	—
Birth Rate	26.2	—
Deaths recorded	414	6
Death Rate	29.3	—
Infant Mortality Rate (per 1 000 live births)	254.1	—
Stillbirth Rate (per 1 000 live births)	113.5	—

The *General European population* (exclusive of Government Officials) was estimated to number 163 within this group the six deaths occurred

European Officials resident numbered 69 with an average number resident of 62. Fifty-one officials were on the sick list during the year subtertian malaria and influenza being responsible for 28 cases three invalidings were recorded. *African Officials resident* numbered 391 with an average number resident of 341. Within this group 415 were on the sick list at some time during the year 6 were invalided and 5 deaths were recorded

Maternity and Child Welfare Work—The results of the year's work carried out in the clinics at Bathurst are said to have been most encouraging numbers increased African women developed a wider interest in the work and many of them continued to attend the clinics regularly after the birth of their babies. In the Clinic Ward of the Victoria Hospital 84 confinements were conducted and there were 44 ante-natal patients. In the Out patient Department 260 women attended the ante natal clinics totalling 1,313 attendances and there were 363 babies on the registers of the Baby Clinics. Of the 370 births recorded in Bathurst 141 were conducted under the supervision of the Clinics

At the Sukutu Clinic good work continued to be done 234 patients recorded 2 304 attendances at the General Clinic and 15 ante-natal patients made 53 attendances. New buildings are to be erected. Ante natal work has also been started at Bwiam by the Medical Officer and satisfactory progress is reported

School Hygiene—The only references to this important branch of work appear in the Report of the Dental Surgeon who states work at the Clinic is primarily devoted to children that there has been a steady growth in the interest and appreciation of dental work in the schools and that the increased record of work was mainly due to the satisfactory attendances of the school-children for treatment. During the year 1 632 school-children were dealt with

Public Health Sanitation etc—Methods of sewage disposal remain for all practical purposes as previously described (see this *Bulletin* 1938 Supp. p. 46*) No system of water-borne sewage can be considered until the Reclamation Scheme in Bathurst is completed and proper drainage of the town provided no effective method has yet been devised for dealing with crabholes (see this *Bulletin* 1938 Supp. p. 45*) which continue to be responsible for excessive mosquito breeding. The system of refuse disposal is said to function satisfactorily even though a number of people still consider the compound as the

most suitable depository for household refuse. Sanitation in the Protectorate is still in its infancy though gradual improvement is being effected through the efforts of the Inspectors stationed in various towns. In one town a night soil service has been provided, and in several towns public latrines have been erected. The bush type septic tanks mentioned in the 1936 Report are reported to be functioning satisfactorily (see this *Bulletin* 1938 Supp. p. 46*).

The supply of water in Bathurst is reported to be adequate as regards quantity and of satisfactory quality. The old water mains are gradually being replaced throughout the town. *Housing and Town Planning* matters continue to receive attention, and a Technical Assistant was appointed to the Public Works Department to supervise and inspect new plans and buildings. Septic tanks and water are installed in four new houses erected, but it is stated that the rigid enforcement of the laws relating to buildings and the solution of the housing problem are dependent upon completion of the Reclamation Scheme. *Markets and Foods* exposed for sale are regularly supervised. Regulations have been made to ensure that hawkers maintain a prescribed standard of cleanliness in so far as their wares are concerned.

The usual measures were taken to spread the knowledge of hygiene and sanitation among school-children and the population at large. Courses of lectures on sanitary law and matters of sanitation were held and attended by the sanitary personnel.

Port Health Work—During the year 279 ships were boarded and inspected and where necessary deck passengers were kept under surveillance. Rat-catching was continued, rats found dead were examined for *P. pestis* but all gave negative findings. The Protectorate of the Gambia was declared an infected local area owing to smallpox in April and quarantine regulations were applied during the year to Gold Coast Colony and to places in Senegal on account of yellow fever. All the 135 aeroplanes and seaplanes arriving during the year had clean bills of health.

Hospitals, Dispensaries, etc.—A new Protectorate Hospital is under construction at Bansaung. This institution is to be admirably equipped and when completed will replace the present Georgetown Hospital. A Leper Camp was opened during the year at Bwiam and has grown much more rapidly than was anticipated.

The four *Dispensaries* continue to do good work in their respective areas (see this *Bulletin* 1938, Supp. p. 47*). Some difficulty is experienced in exercising adequate supervision of these centres by Medical Officers and steps are being taken to devise a means of dealing with their more efficient control. The records of work dealt with at Hospitals and Dispensaries during the year under review may be set out as shown in table overleaf p. 41*.

The notes which follow briefly summarize the principal references in the 1937 Report to mortality experience in the Gambia during the year under review.

Cases of malaria treated during the year numbered 1 029 distributed as to 13 benign tertian, 763 subtertian, 1 malarial cachexia and 252 unclassified. Of the total cases dealt with 667 were treated at the Victoria Hospital, Bathurst, 86 of them as in-patients, 77 at Georgetown Hospital, of which 6 only were in-patients and 285 out-patients at Bwiam Hospital. No case of *blackwater fever* was recorded in the

Hospitals during the year but a fatal European case was reported from the town of Jawarra North Bank Province (see below under *Scientific*)

Centro	In patients			Out patients
	Admitted	Treated	Deaths	
Victoria Hospital Bathurst	1 060	1 133	131	19 475
Prison Hospital Bathurst	—	89	—	131
Georgetown Hospital	412	462	69	5 896
Bwiam Hospital	108	115	12	6 291
Basse Dispensary	—	—	—	8 642
Kanur Dispensary	—	—	—	7 076
Kaiaf Dispensary	—	—	—	3,235
Herewan Dispensary	—	—	—	6,214

The usual routine anti malarial measures continued to be regularly carried out in Bathurst regular and persistent house-to-house inspections were maintained and the prophylactic use of quinine advised and encouraged. It is pointed out that no sanitary efforts can hope to eradicate mosquito-borne diseases until proper drainage under the completed Reclamation Scheme has been provided.

No case of *yellow fever* was recorded the immunization of Europeans was rigorously insisted upon after the 1934 epidemic but more recently many persons neglected this wise precaution. Towards the end of 1937 an intensive campaign was instituted with the result that practically all Europeans and not a few Syrians have now been inoculated. The larval index for Bathurst for the year was 0.22 but in outstations the figure ranges between 0.13 in Basse to 5.20 in Barra. An outbreak of *smallpox* involving practically the whole of the Protectorate occurred from March to June. Nine cases with 1 death are mentioned but it is stated that dependable figures of cases and deaths are lacking owing to the widespread nature of the epidemic. The usual measures of isolation segregation and vaccination were carried out in Bathurst 12 903 and in the Protectorate 14 775 vaccinations were performed. No case of *plague* was reported (see above *Port Health*).

Trypanosomiasis is reported to be still increasing and is said to be still the great danger of the Colony. During the year 2 025 cases were dealt with at the three hospitals with 37 deaths and 37 were treated at Government Dispensaries. A survey of the population was carried out in MacCarthy Island and North Bank Provinces between March and June 1937 by Dr J. L. LOCHHEAD and during the course of the investigations 7 151 persons were examined. In an Appendix to the Report under review this enquiry and the results recorded are presented in detail but for present purposes a brief summary of the principal findings must suffice. Dr Lochhead found the disease present in all the areas he visited with incidence ranging from 1 to about 12 per cent between village and village though he believes his figures under-estimate the actual incidence of the disease. His recommendations include bush clearance around villages removal

regular tours of inspection of all bush villages. If financial provision can be made it is hoped to inaugurate an anti-trypanosomiasis campaign in 1939.

Only 1 (non fatal) case of *enteric fever* appears in the Hospital Returns but of *dysentery* 123 cases with 4 deaths are recorded, and of the totals 63 were amoebic (and responsible for the 4 deaths) 38 bacillary and 22 were unclassified as to type of infection.

Tuberculosis (all forms) was responsible for 231 cases with 16 deaths 211 of the cases and 14 of the deaths were ascribed to the *pulmonary* form of the disease. No facilities exist at present for the isolation of cases. sputum-positive cases are treated in the medical wards of the hospitals and in case of death the house and clothing of the deceased person are disinfected. Hospital Returns also show that 4 167 persons suffering from *bronchitis* and *broncho-pneumonia* were treated as in- and out patients with 13 deaths and 97 *pneumonia* cases were dealt with and 20 deaths ascribed to this cause.

Helminthic diseases are widely prevalent and directly due to bad sanitation and pollution of ground and water. The recorded figures of cases treated though no indication of the actual incidence of these diseases read *ascariasis* 1 449 *ankylostomiasis* 91 *schistosomiasis* 74 and *taeniasis* 128 (see this *Bulletin* 1938 Supp. p. 48*).

Leprosy—Mention has already been made of the establishment of a new leper camp at Bwiam (see *Hospitals* above). The Leper Colony at Buruko MacCarthy Island Province has functioned with steadily increasing success (see this *Bulletin* 1938 Supp. p. 48*) it has been suggested that a village be erected in the vicinity for the accommodation of relatives of the Leper Colony. In the whole territory 399 cases of leprosy were recorded. At the two Leper Colonies in the Protectorate 113 advanced cases were admitted during the year 4 deaths were recorded 60 patients were discharged and at the end of the year there were 73 patients still under treatment. During the course of his sleeping sickness survey (see above) Dr. Lochhead reports that very few persons were seen suffering from the disease.

Veneral diseases do not appear to be mentioned in the text of the Report but Hospital Returns show that 129 persons were treated for *syphilis* 568 for gonococcal infections, and 23 for soft chancre. There were 1 642 cases of *syphilis* the majority of these occurring in the Protectorate. Attention is called to the fact that while in 1936 Georgetown returned 1,948 cases of the disease (see this *Bulletin* 1938 Supp. p. 49*) from the same area only 1 171 cases were recorded during 1937. It is thought that the decrease may be due to the fact that cases were not recorded as *syphilis* without obvious clinical signs, or that treatment and improved sanitary conditions have contributed to an actual decline in the incidence of the disease. In his report of the sleeping sickness survey Dr. Lochhead speaks of the disease being met with everywhere and says that probably 20 per cent. of the people show some signs of having had the disease.

Other diseases referred to in the Report under review include 1 024 cases of *influenza* mainly resulting from a sharp outbreak of the disease in Bathurst in July 188 cases of *filarial elephantiasis* 23 of *whooping cough* and 3 of *measles*. It is stated that during the year 19 deaths were ascribed to *tetanus*. Hospital Returns show 15 cases with 7 deaths.

Scientific—The Report of the Victoria Hospital Laboratory Bathurst records the numbers of specimens received and examined during the year but findings are not recorded. Dr MURCATROYD of the Liverpool School of Tropical Medicine continued his investigations in the chemotherapy of trypanosomiasis but had to return to England before this work was completed (see this *Bulletin* 1938 Vol. 35 p. 340 and Supp. p. 49*) In an Appendix to the Report are given the results of the pathological findings of a suspected case of blackwater fever (see above *malaria*) which occurred at Jawarra and terminated fatally. Owing to marked *post mortem* changes in the specimen examined conclusive diagnosis proved difficult.

Financial—Total expenditure during 1937 on the Medical and Health Services amounted to £32 109 a sum which represents 9.3 per cent. of the total expenditure of the Colony.

EAST AFRICA

KENYA COLONY AND PROTECTORATE (1937)

Kenya Colony and Protectorate is in Eastern Equatorial Africa. It is bounded on the north by Abyssinia and the Sudan, on the west by Uganda, on the south by Tanganyika Territory and on the east by the Indian Ocean and Italian Somaliland. The total area is 224 960 sq miles and is divided into nine provinces: Nyanza, North Turkana, Rift Valley, Masai, Kikuyu, Ukamba, the Coast, and the Northern Frontier Provinces. Its capital is Nairobi and Mombasa the principal port.

Vital Statistics—For several years each Annual Medical Report has called attention to the fact that no system of vital registration is established in the Colony and Protectorate of Kenya. The Report under review observes that this important requirement still remains unfulfilled and that deductions which, with the assistance of dependable vital statistics might be drawn with reasonable accuracy as regards the state of the public health, must give way to a more speculative assessment based upon such information as becomes available from institutional and district reports (see this Bulletin 1933 Supp. p. 33*, 1937 Supp. p. 39* and 1938 Supp. p. 50*). It is of the utmost importance that an effective system of vital registration should be established if health administration is to progress along organized and economic lines. Birth, death and infant mortality rates cannot be calculated: the only data available are the following—

Race	Estimated Population	Births	Deaths	Immigrants	Emigrants
Europeans and Whites	19 311	313	119	6 258	5 668
Africans	3,253,689	65	1 710	2,743	1,966
Arabs and Others	15 285				
Asiatics, Indians, Goans	42 368				
	3 658	98	33	793	687

European Officials resident numbered 1,865 with an average number resident of 1,430. Six died and four were invalided. *Non-European Officials* resident numbered 2,433 with an average number resident of 2,090. Seven died and seven were invalided.

Maternity and Child Welfare Work—It is said that in no other branch of the Department's activities has there been greater comparative progress than in this. A few years ago great difficulty was experienced in persuading women to attend treatment centres for ante-natal and maternal care whereas nowadays the difficulty is to provide accommodation for them. The actual work is undertaken by Government and Local Authorities both European and African Missions, and the Lady Grigg Welfare League. *The training of Asian and African Midwives* continues at Nairobi with the object of providing increased maternity facilities for these sections of the community during the year under review 17 African midwives were in training

and 3 qualified and at the Indian centre where 4 were in training 1 qualified.

The Missionary Societies Municipal Council of Nairobi, and the Lady Grigg Welfare League continue to receive financial assistance from Government for the work they undertake. Figures for maternity work carried out during the year read as follows —

	Maternity cases
At 9 Government Hospitals	359
At 7 Centres established with the help of Local Native Council Funds	1 313
At 3 Centres of the Lady Grigg Welfare League	629
At 8 Missionary Society Centres	1 071*

[*In another section of the Report given as 971]

Ante Natal and Child Welfare Work is undertaken by the Medical Department at 5 centres in Mombasa and 1 in Eldoret and by the Municipal Council in Nairobi. The volume of work dealt with is summarized below —

	Attendances.	Home Visits.
Mombasa	40 240	19 721
Eldoret	4 831	4,975
Nairobi	60,999	15,812

School Hygiene—Once again it is reported. No school medical service exists at the moment. In townships and native reserves medical officers and sanitary inspectors have devoted much attention towards improving the general hygienic conditions of schools and their endeavours have met with success. The health and dietaries of school-children are said to be supervised so far as circumstances will allow.

Public Health Sanitation etc—Though no appreciable extension of medical services was possible considerable progress is recorded during the year no serious outbreak of infectious disease occurred the general health of the people is said to have been on the whole satisfactory (see comments on assessments of the state of the public health *Vital Statistics* above). The part played by local bodies as Public Health Authorities increases and their duties have in general been efficiently discharged. Public health activities in the *Native Reserves* were maintained the Local Native Councils are proving important and progressive influences in their respective areas. The general scheme of work as applied to the native reserves is said to have exceeded all expectations—the experimental stage is giving way to a settled and progressive policy and particularly good results are reported with regard to *housing* and the cleaner village campaigns.

A notable event in the year's Public Health history was the sudden incursion of some 7 000 Abyssinian refugees in June and July introducing medical problems of no little magnitude, which however were successfully dealt with. The incursion is described in detail in the Report under review.

Routine and *anti-malarial measures* were continued throughout the year and experiments with various larvicides were carried out. Marked progress is reported in connexion with the anti-malarial scheme at Kisumu (see this *Bulletin* 1933, Supp. p 51*)

A marked improvement is reported in the *general sanitation* of the smaller townships and trading centres a number of them are now provided with *water supplies* and *night soil* and *refuse disposal* services are being extended. Sanitary conditions in the larger towns continue to improve and are said to be fairly satisfactory.

While no major schemes of *housing and town planning* were undertaken the campaign directed towards development and progress in these matters continued and increased provision of housing in permanent material is reported. The *nutritional state* of the population shows some evidence of improvement with decline in the grosser manifestations of *hypovitaminosis* it is added that the nutritional problem should be investigated very fully. The usual inspection and control of foods and drinks was continued.

The position with regard to recruitment housing, etc. of African labourers cannot be described as altogether satisfactory. On the other hand many employers are effecting improvements as circumstances permit.

The systematic *training of African sanitary personnel* has not yet been placed on an organized basis. Suitable African candidates engaged for work in the native reserves have been trained as sanitary assistants under a European Sanitary Inspector.

Port Health Work—During the year 738 steamships and 1427 dhows entered Kikindini or Mombasa harbours, 19423 passengers were medically inspected and 269 passengers landed under surveillance. No ship arrived with any case of major infection among passengers or crew. Rat destruction work continued to be carried out. 11411 rats were trapped and 833 were examined for plague none being found infected. (In the Laboratory Report mention is made of the examination of 30 rats, 15 of them proving positive with *P. pestis*.)

With regard to *aerial traffic* the position in respect to authorized landing grounds remains as previously described (see this *Bulletin* 1938 Supp p 52). Mosquito surveys were carried out at airports during the year and the numbers of houses and trees with *Aedes aegypti* recorded. the *Aedes* index was found to range from 0.01 per cent in Kisumu to 18 per cent in Nairobi.

Hospitals Dispensaries etc—The growing number of Africans who seek admission to hospitals is throwing an increasing strain on available accommodation. most hospitals are overcrowded to a degree which causes anxiety. In the native reserves no new hospitals were opened but some additional accommodation was provided at existing institutions from funds made available almost entirely by Local Native Councils. Progress in connexion with preparation of the plans for the new Group Hospital in Nairobi is recorded, and it is expected that building operations will be commenced in 1938.

The fact that in 1937 over 130000 more persons received medical treatment than in the preceding year is not necessarily indicative of increased invalidity but more probably of greater appreciation of medical facilities and faith in European treatment. The volume of work dealt with at all treatment centres may be summarized as follows:—

	In-patients	Deaths	Out patients.
Europeans	1788	29	2765
Asiatics and Africans	50,915	2,706	468,469

A further analysis of the above figures shows that of the gross totals 27,907 in patients were treated at institutions in Townships 943 in Turkana Northern Frontier Province and Lamu and 23,853 in hospitals in native reserves the figures for out patients being given as 209,559 42,864 and 239,958 respectively. [Gross totals for out patients are not in agreement viz for Europeans Asiatics and Africans in the first statement read 469,234 and in the second 492,681.]

In addition at *Out Dispensaries* 645,688 persons received medical treatment during the year.

To *Prison Hospitals* 2,988 patients were admitted and 83 died and to the *Muthari Mental Hospital* 153 cases were admitted 254 were treated and 14 died. [These figures are presumably included in the gross totals quoted above.]

At 8 *Mission Hospitals* 9,054 in patients and 151,254 out patients were dealt with. Figures for Out Dispensary treatments are given for four hospitals only.

The training of Africans to qualify as hospital assistants or nursing orderlies was continued. Eleven candidates qualified as hospital assistants and of three compounders under training two passed the final examination. It has not been possible to arrange for the systematic training of African women as nurses but facilities will be provided on completion of the new Group Hospital at Nairobi.

The notes which follow briefly summarize the references to the more outstanding causes of morbidity and mortality based upon information obtainable from institutional and district reports for the year under review.

Malaria was the principal cause of morbidity and is said to have been responsible for 43,850 cases (exclusive of cases treated at Out Dispensaries) with 209 deaths (see below). An epidemic wave of the disease affected practically the whole Colony during and after the long rains which were exceptionally heavy, the only areas not recording heavy incidence being the Fort Hall and Meru districts of the Central Province and Teita district in the Coast Province. The town of Mombasa experienced the worst visitation for some years and in Nairobi the number of cases was higher than in 1936. According to Hospital Returns the cases of malaria treated for Europeans and Non Europeans classified by types of infection for in and out patients read as follows —

Type	Europeans			Asiatics and Africans			Total cases all classes
	In patients	Deaths	Out patients	In patients	Deaths	Out patients	
Subtertian	140	2	127	3,925	107	7,408	11,600
Benign Tertian	66	—	6	489	15	1,315	1,875
Quartan	2	—	6	178	7	588	784
Clinical	55	—	119	1,804	29	22,282	24,260
Cachexia	—	—	—	31	8	283	319
Cerebral	1	—	—	40	28	—	47
Undifferentiated	45	—	13	402	5	4,366	4,826
Totals	309	2	270	6,869	199	36,257	43,705

It will be seen that 43 705 cases were dealt with (not 43 650 stated in the first place) with 201 deaths and that 579 of the cases and 2 deaths occurred among Europeans. In addition there were 26 cases of *blackwater fever* with 8 deaths 7 of the cases and 1 death occurring among Europeans.

At the Medical Research Laboratory where 16 087 blood films were examined 2 285 were positive with *P. falciparum* 118 *P. vivax* 49 *P. malariae* 1 *P. ovale* 79 *P. falciparum* (crescents) and 40 were mixed infections. At the Clinical Laboratory Mombasa among 6 951 blood films examined 1 300 contained *P. falciparum* 47 *P. malariae* and 15 *P. vivax*.

Yellow fever is still unrecorded in the Colony and so far no mouse-protection test has been positive. A small *Aedes* survey was carried out by the Section of Medical Entomology in a rural area of Central Kavirondo and an *Aedes aegypti* breeding index of 0.4 was recorded. Kisumu township is said to have been free from *Aedes aegypti* for some years. Control measures are to be extended to other areas.

Smallpox imported by Abyssinian refugees (see above *Public Health*) was confined by energetic action to the Northern Frontier District where "two to three hundred cases occurred. Routine vaccination was continued and 13 013 vaccinations performed.

Plague 158 cases reported (68 recorded in Hospital Returns with 41 deaths) 12 of these occurring in the European farming district of Nakuru 11 from one farm alone and 25 within the Nairobi Municipal area. The clearing and cleansing campaign commenced in the Central Province was continued with extension to all other areas (see also *Port Health* (Fork above)).

It is said that 24 cases of typhus were recorded with the additional comment that many cases occurred among Abyssinian refugees. Hospital Returns show only 8 in-patient cases and 1 death 7 of the cases (all non-fatal) occurred among Europeans. A decline in the incidence of *cerebrospinal meningitis* is recorded, cases numbering 227 of these 216 were treated as in-patients (1 European only) with 134 deaths. Abyssinian refugees are also said to have imported *relapsing fever*. Classified returns show 63 cases with 1 death among 10 in-patients. Twelve cases of *undulant fever* were notified the serum of all cases agglutinated positively with *Br. abortus*. Other infections included 124 reported cases of *anthrax* (79 in-patients 5 deaths all non-Europeans) and 23 African cases of *diphtheria* with 3 deaths.

Fatieric fever was responsible for 243 cases and 54 deaths. At the Medical Research Laboratory among 784 specimens of serum tested for agglutinins against the enterica group 175 reacted positively with *Bact. typhosum* 5 with *Bact. paratyphosum A* and 11 with *Bact. paratyphosum B*. In one section of the Report it is stated that cases of dysentery numbered 3 404 but the classified Hospital Returns record 3 438 the distribution of types of infection being amoebic 1 663 bacillary 172 and undefined 1 601. The importance of amoebiasis as a cause of invalidity is emphasized in several District Reports though conflicting reports are made as regards the saprophytic existence of *E. histolytica*. At the Medical Research Laboratory *E. histolytica* was found in 457 cases among 9 823 faecal specimens examined and at the Mombasa Clinical Laboratory 298 times among 4 503 specimens.

Thirty cases of *trypanosomiasis* are said to have been treated as in patients [27 in Hospital Returns plus 3 out patients] and in addition 103 cases were noted among outstation dispensary patients and during visits to special areas. Incidence seems to be confined to the Central and South Kavirondo districts along the Lake shore. During the year 9 740 natives were examined 762 gland and blood examinations made and 21 new cases discovered. Control measures by the block and barrier method were continued and the question of the settlement of natives on reclaimed areas under controlled conditions was considered.

In the text of the Report it is stated that 1,391 cases of *tuberculosis* were treated but the classified Hospital Returns show 1 451 cases of all forms of the disease and of this total 895 were *pulmonary* cases. 8 of the *pulmonary* cases were Europeans one died, and 560 were Africans and Asiatics and of these 153 died. Recorded cases are said to be no true index of incidence among the general population. An extension of facilities for sanatorium treatment is said to be urgently required. At the Medical Research Laboratory 122 out of 1 394 specimens of sputum were positive with *Mycobacterium tuberculosis* and at the Mombasa Clinical Laboratory 149 positives were recorded among 600 specimens examined. *Pneumonia* (all forms) kills more than *tuberculosis*—807 deaths were ascribed to *pneumonia* as against 154 for *tuberculosis*. Cases of *pneumonia* treated numbered 4 133 and of these 3 025 were in patients. 20 were Europeans and 4 died. Prominent among other *respiratory affections* were *bronchitis* with 50,364 cases and 26 deaths and *asthma* with 1 148 cases and 5 deaths.

Helminthic diseases—The following data extracted from Hospital Returns relate to the principal infections dealt with. (They are not in agreement with the figures quoted on p. 18 of the Report under review) —

Infection	In-patients		Out patients		Totals All Races
	Europeans	Others	Europeans	Others	
Ankylostomiasis	5	872	1	1 485	2,363
Ascariasis	2	663	2	8 630	9 297
Taeniasis	5	951	2	46,558	47 516
Dracontiasis	—	4	—	6	10
Schistosomiasis	5	353	2	525	895

At the Medical Research Laboratory where 9,823 faecal specimens were examined, the ova of *Taenia* were found in 1,836 of *Ascaris* in 1,241 of *ankylostome* in 1 123 and *S. mansoni* 166 and at the Mombasa Clinical Laboratory the following *helminths* were found during examination of 4 603 faecal specimens—*ankylostome* 1,213 *Ascaris* 787 *Taenia* 474 *Trichuris* 929 and *S. mansoni* 111.

Leper patients are cared for at the Government Camps maintained at Kakamega and Mombasa, and in addition 55 beds are reserved for cases at certain Mission Hospitals. During the year 179 cases were under treatment at Kakamega and 63 at Mombasa—these numbers

are no true assessment of the incidence of leprosy which is believed to be increasing. A tentative scheme for the control of the disease in the Kavirondo Reserve has been well received by a Committee of the Local Native Council—good results are anticipated when this scheme becomes fully effective.

Clinics for the treatment of venereal disease remain as previously described (see this *Bulletin* 1936 Supp. p. 55*). Total cases treated during the year were, syphilis 8,954 soft chancres 157 gonococcal infections 4,141 and granuloma venereum 2. The only European cases were 4 for syphilis and 5 for gonococcal infections. At the Medical Research Laboratory the Kahn test was applied to 4,014 specimens of sera—1,585 gave positive and 328 doubtful reactions. Among 289 urethral smears 102 were positive with *N. gonorrhoeae* and 13 out of 64 cervical and vaginal smears were positive. At the Mombasa Clinical Laboratory where 660 specimens of urethral exudate were examined 297 gave positive results.

For yaws 13,174 persons received treatment according to the classified Hospital Returns. The general impression seems to be that yaws is decreasing in most areas.

Other diseases mentioned in the Report and calling for brief mention in this Summary, include the following—

Diseases of the Eye are under the control of the Ophthalmic Specialist appointed during the year. Two wards for the admission of cases have been provided at the Nairobi General Hospital and clinics are held daily at the General Dispensary. According to Hospital Returns 18,635 cases were dealt with and of these 225 were cases of trachoma—it is said the recorded cases of trachoma understate the actual incidence of the disease. *Malignant diseases* were responsible for 167 cases, *acute rheumatism* for 3,947 cases, *ulcers* for 36,435 cases and *external causes* 65,548 cases.

Scientific—Dr F. W. LESTER contributes his usual detailed account of the activities of the Medical Research Laboratory and records a further increase in the volume of work dealt with in 1937. The results of the routine examination of a total of 58,829 specimens are tabulated—some of these are discussed under various headings in the preceding notes. The increases in routine diagnostic work and the preparation of laboratory products occupy the full time of the staff to the detriment of research work, yet among important investigations undertaken the following may be mentioned. In the Prison Hospital, Nairobi, a helminthic investigation is in progress having special reference to the efficacy of various drugs on intestinal helminths. A survey of *Bac. typhosum* "H" and "O" agglutinins in sera from Africans not suspected of suffering from typhoid was completed and the results published under the title "*Typhoid Agglutinins in the Native Population*" by R. M. DOWDSEWILL, *Trans. Roy. Soc. Trop. Med.* Vol. 31, Nov. 1937. An examination of the dietaries in use in Government Native Hospitals was made and a large-scale rat feeding experiment was planned and is in progress.

A résumé of the year's work at the Mombasa Clinical Laboratory appears in an Appendix.

The Report of the Section of Medical Entomology describes the mosquito surveys and malaria control work carried out, the searches for insects in aeroplanes landing in the Colony, work concerned with

the elimination of *tsetse flies* and sleeping sickness control fly breeding and a rat flea survey The following paper was published —

EVANS (A M) & SYMES (C B) *Anopheles funestus* and its allies in Kenya
Ann Trop Med & Parasit 1937 Apr Vol 31

Financial —Actual expenditure during 1937 on Medical Department services amounted to £213 758 as compared with a sanctioned estimate of £210 448 Expenditure represents 6.1 per cent. of the total estimated expenditure for the Colony and Protectorate during the year under review

UGANDA PROTECTORATE (1937)

The Uganda Protectorate lies in the northern part of the Great Lakes region of Africa It has no sea coast, being bounded by the Anglo-Egyptian Sudan on the north Kenya Colony on the east, Lake Victoria Nyanza and the Tanganyika Territory on the south, and the Belgian Colony on the west The area of the Protectorate is estimated at 94 204 sq miles, including 13 616 sq miles of water (The area of England without Wales is a little over 50 000 sq miles) The head quarters are at Entebbe and the chief commercial towns are Kampala and Jinja. All three are on or near the north shore of Lake Victoria

Total Statistics —For the native population only the principal facts are as follows —

Province	Estimated Population	Live Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.S.L.R.
Buganda	888,244	20 073	22.6	16,004	18.0	1,593	79.4
Eastern	1 189,204	29 977	25.2	26,141	22.0	5 183	173.1
Western	741,281	19 010	25.6	11,921	16.1	2,494	131.2
Northern	807,820	23 009	28.5	14 669	18.2	5 057	219.8
Protectorate	3 628,549	92,069	25.4	68 735	18.9	14,332	155.7

The above figures summarize the excellent Tables which provide data in great detail for both Provinces and Districts in the Protectorate.

European Officials resident numbered 595 with an average number resident of 499 One invaliding and four deaths were recorded. Among European non-officials 1,837 cases of sickness were treated by Government Medical Officers *malaria* accounting for 371 of the cases dealt with *injuries* 113 and *diseases of the digestive system* 110 there were 16 deaths recorded among European non-officials.

Asian Officials resident numbered 337 with an average number resident of 323 three were invalided but no deaths were recorded The Government Medical staff treated 8 124 cases of sickness among Asian non-officials and 75 deaths were reported within this group.

African Officials (African Civil Service) resident numbered 212 with an average number resident of also 212 There were no invalidings, but one death occurred within this group

Among all groups of officials and non-officials *malaria* was the principal cause of ill health

Maternity and Child Welfare—Though the Provincial and District infant mortality and maternal mortality rates have been subject to variation during the past seven years, for the Protectorate as a whole these rates have declined steadily and testify to the efficacy of ante-natal and child welfare work in the territory. It is said that little progress has been made in increasing the number of maternity centres, yet despite this and other handicaps the tabulated facts supply ample evidence not only of the considerable volume of work dealt with but also of the success achieved in this important field. For example during the year under review 16,678 women attended for ante-natal supervision at the larger centres, 1,745 of them terminated their pregnancies in hospitals or at maternity centres and among them 1,578 live births and 62 maternal deaths were recorded. On the other hand a further 484 women who had not availed themselves of ante-natal treatment were delivered in hospitals of 311 live babies with 42 maternal deaths. The figures for those who did not attend for ante-natal supervision again compare unfavourably with those who did. Then again, 2,116 women after attending ante-natal centres were reported to have been confined in their own homes where they gave birth to 2,024 live babies with only 18 maternal deaths. *Infants attending Welfare Centres* numbered 17,792—these figures relate only to healthy children brought to the centres for advice and supervision—sick children are included in hospital and dispensary returns.

Patients admitted to the wards of the *Lady Coryndon Maternity School* numbered 569 during the year 410 confinements, 312 live births 14 infant deaths and 33 maternal deaths were recorded. The Out-patient Department dealt with 2,948 expectant mothers and undertook the post-natal supervision of 651 babies. At 22 country centres there were 1,809 confinements, 1,523 live babies were born infant deaths numbered 37 and maternal deaths 6 at these centres 11,184 new ante-natal cases were dealt with, 13,860 attendances were recorded at child welfare clinics and total out-patient attendances were 68,742.

To the wards of the *Nsambya Maternity Training School* 371 patients were admitted, confinements numbered 295 live births 260 while 18 infant deaths and 10 maternal deaths were recorded. At 15 country centres confinements totalled 1,806, live births 1,805 infant deaths 23 and maternal deaths 11 records at these centres also include mention of 4,272 new ante-natal cases 2,892 attendances at child welfare clinics, and 37,872 out-patient attendances.

With regard to the *training of nurses and midwives* at the *Lady Coryndon Maternity Training School*, of the 39 students in training, 14 were successful in obtaining the Certificate of the Uganda Midwives Board, and at the *Nsambya Maternity Training School*, 7 of the 30 native students in training obtained this qualification. There are now 63 European and Asian and 217 African Midwives on the registers of the Uganda Midwives Board. It remains to add that during the year a district midwife was posted to the township of Hobna for special ante-natal work among native women. If this experiment proves successful it may lead to extension of trained supervision of maternity work among African women with corresponding decrease in obstetrical disasters.

School Hygiene—Periodic visits of inspection continued to be made to schools in most districts by Medical Officers and their assistants (see this *Bulletin* 1938 Supp p 57*) In Busoga the Senior African Medical Assistant examined the pupils at Mwiru College treatment was provided where necessary The experiment in nutrition in the Mengo District (see this *Bulletin* 1938 Supp p 57*) was concluded with the most encouraging results In an Appendix to the Report under review Drs J Scott BROWN and L J A LOEWENTHAL report the results of the investigation under the title of *The Value of Milk as an Adjuvant to the Diet of School Boys* After a routine examination of the boys attending the C.M.S. School at Mukono 30 were chosen at random and each given half-a pint of milk on every day of attendance Briefly results show a significant extra gain in height that the small superiority in weight gain was not statistically significant and that optimum nutrition is not obtainable from normal African diets A fuller account of the investigation appeared in the *East African Medical Journal* The investigation continues and a similar experiment is in progress at Teso

Public Health Sanitation &c—No new schemes of development were introduced during the year the policy outlined in 1934 (see also this *Bulletin* 1937 Supp pp 46-47*) was however steadily pursued and of this it is said that in certain places the first fruits are beginning to appear Considerable progress is reported with the Kampala *saustrage* system and though the disposal works are not yet completed a number of houses have already been connected up to the sewers Several houses in Entebbe have septic tank installations though these cannot be brought into use until the piped water supply from Lake Victoria has been completed Government houses in Mbale also have septic tank installations operated in connexion with the newly constructed gravity water supply In Government quarters in Fort Portal the double bucket system is in use and in the larger and some of the smaller townships the single bucket system is used Dr W H KALNTZE C.M.G. Director of Medical Services contributes an interesting commentary on rural sanitation and of how sanitary ideals are to be realized in spite of inherited native beliefs The provision of a filtered and chlorinated piped water supply was partially completed in Mbale and in Entebbe while in rural areas the protection of water supplies continued to receive special attention.

With regard to *housing and town planning* it is reported that new Asian dwellings are being built to better design, that building rules are strictly enforced and that Africans are gradually developing an interest in model housing schemes The provision of cheap housing for Africans is a problem of urgency in the townships, where efforts are being made to improve living conditions by laying out plots in areas zoned for certain classes of housing A detailed description is given of a two-roomed house suited to the needs of the general African population and costing between £20-£25 to build A Committee has been appointed to investigate *labour conditions* in Uganda meanwhile the standard of housing of labourers is said to improve.

The question of *food in relation to health and disease* is receiving special attention The Report of the Nutrition Sub-Committee of the Agricultural Survey indicates that large sections of the population suffer from malnutrition steps have already been taken

with a view to improving existing conditions (see the experiments with milk diets under *School Hygiene* above). Agricultural surveys continue to be made to determine the quantity and quality of locally grown foodstuffs, while selected youths are trained in improved farm methods at farm schools at Lira and Gulu. Rules for regulating the sale of milk are in course of preparation.

Health propaganda continues to be carried out in all districts, with encouraging results.

The training of African Sanitary Inspectors has progressed satisfactorily (see this *Bulletin* 1938, Supp. p. 58*) and the final examination of the first batch of students will take place in November 1938 under the auspices of the Royal Sanitary Institute London.

Hospitals Dispensaries etc (see also this *Bulletin* 1938 Supp. p. 59). The Tororo Hospital which will provide in and out patient accommodation for Asians and Africans, approaches completion. To the Jinja Hospital, two new African wards, an Asiatic Maternity Ward out-patient block and other constructions were added. Minor improvements were carried out to other hospitals in the Protectorate. Three new dispensaries and two additional dressing posts were opened during the year.

The training of African female nurses continues at the hospitals at Namirembe and Mubaga with successful results.

The records of the year's work at hospitals and dispensaries is summarized below—

Hospitals, etc.	Beds	Admissions	Treated	Deaths	Total New Cases	Total Re-Attendances
4 European	34	533	—	—	490,234	533,727
9 Asiatic	56	1,635	—	—		
23 African	1,277	31,250	—	—		
97 Dispensaries	928	7	—	—	533,727	1,182,941
Totals	1,992	33,443	34,487	1,799	1,023,961	1,686,668

A new nomenclature has been adopted for the tabulation of diseases and deaths in the Uganda Annual Medical Reports. This new departure permits the presentation of the relevant facts within the limits of *three pages* in place of the 19 pages formerly necessary for this section.

Medical Education—The Report of the Commission appointed by the Secretary of State for the Colonies to advise on higher education in East Africa drew attention among other matters to the fact that the basic education of the African recruit to the medical course is very deficient and that his knowledge of the preliminary sciences is not of a sufficiently high standard. To meet these requirements the new biology chemistry and physics laboratory under construction at Makerere College should enable the standard of these courses to be raised considerably. A new building is to be erected to replace the present medical school which lacks adequate accommodation.

The Report of the Uganda Medical School describes the year's work and presents details of the numbers of students taking the various

grades of examination results of those examinations and the more significant comments made by the external examiners. It is noted that since 1923 thirty five students have been licensed to practise and 30 of these are in the service of the Uganda Government.

With regard to *morbidity experience* during the year it is stated that with the exception of malaria and blackwater fever a general decrease in the incidence of the major communicable and infectious diseases was noted during 1937. The notes which follow briefly summarize more extensive commentaries in the Report relating to the principal diseases dealt with at hospitals and dispensaries.

A further increase in the number of *malaria* cases is reported: 72,238 as compared with 71,407 in the preceding year (see this *Bulletin* 1938 Supp. p. 59*). Of the total cases recorded 31,314 were dealt with at station hospitals and 40,924 at dispensaries while at all centres approximately 50 per cent. of the cases were microscopically diagnosed. On the other hand the 'Return of Diseases and Deaths' shows that 32,142 in- and out-patients were treated for the disease the distribution of types of infection being *benign tertian* 1,997 *quartan* 1,304 *subtertian* 7,800 and *unclassified* 21,041 hospital deaths ascribed to the disease numbered 134. The usual routine anti-malarial measures continued to be carried out at most stations with reclamation of swampy areas sub-soil drainage controlled tipping and other works in specific areas.

Of *blackwater fever* 170 cases and 43 deaths were reported and of these 66 cases with 23 deaths were treated by Government Medical Officers and the remainder by private practitioners. Of the total cases 14 were European (4 deaths) 150 Asians (38 deaths) and only 6 African with 1 death. The incidence and distribution of blackwater fever in Uganda is set out in great detail in an admirable series of tabulated statements with distinction as to race province district age etc.

No case of *yellow fever* was reported during the year. In view of the suspicious cases reported by the District Medical Officer Masaka in 1936 that District first engaged the attention of the *Yellow Fever Commission* of the Rockefeller Foundation (see this *Bulletin* 1938 Supp. p. 60*). No cases of clinical yellow fever were seen while sera from 35 cases of fevers of undetermined origin when inoculated into animals gave negative results. Protection tests were carried out: sera from 37 children all gave negative results, but 6 from 174 adults were positive. The Commission continued investigations in the Bunyoro Chua and West Nile Districts of the Northern Province with somewhat similar results. In Bwamba County of the Toro District (Western Province) 25 sera from 53 adults gave positive findings. Protection tests were carried out on 141 people of all ages—sera from 16 were positive. Results suggest that a jungle type of yellow fever may be present in Bwamba. Measures to combat *Aedes aegypti* were continued. The Government Entomologist reports that investigations into the incidence of *Aedes aegypti* were carried out in rural areas in the West Nile District and in the vicinity of Kampala. These investigations continue.

It is said that *plague* appears to be undergoing its periodic fall in incidence and that the decrease in the number of cases during 1937 is not due to any real improvement in its control which "will only

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It is said that *plague* appears to be undergoing its periodic fall in incidence and that the decrease in the number of cases during 1937 is not due to any real improvement in its control which "will only

become effective when the African builds for himself a house which contains no real harbourage for rats, and adopts habits of food storage and refuse disposal which deprive the rodent of any food. During the year under review 515 cases with 478 deaths were recorded, and of these 371 cases with 338 deaths occurred in the Eastern Province and 112 cases with 108 deaths in the Mengo District of Buganda Province. Canning of infected huts continues as a routine measure but de-batching of infected huts has been applied more extensively. At the Laboratory 377 smears were examined for the presence of *P. falciparum* but findings are not recorded. The Government Entomologist reports that tests carried out with ferrets for the detection of rats (see this *Bulletin* 1936 Sapp. p. 60*) were unsatisfactory, the size of the male animals preventing them from reaching places accessible to the rodents; two female ferrets are to be tried. Rat and flea surveys were carried out in various areas.

Of relapsing fever 453 cases were reported, but total deaths due to this cause are not stated. Of the total cases 375 were macroscopically diagnosed and 367 were treated in hospitals, with 25 deaths. The Government Entomologist experimented with various larvicides for the destruction of *O. moubata*; these tests continue. Five cases of typhus were recorded. The value of the Carnus disinfectant in controlling the disease is again emphasized (see this *Bulletin* 1936 Sapp. p. 47* and 1937 p. 49*). There were 310 cases of cerebrospinal meningitis with 118 deaths. The disease appears to be endemic in the Western Province and Masaka (Buganda Province) while sporadic cases occurred in other areas. All the cases (72) reported from Bunyaga (Eastern Province) are stated to have occurred in immigrant labourers. Segregation of contacts in temporary shelters has been continued (see this *Bulletin* 1936 Sapp. p. 61).

No case of smallpox was notified but the vaccination campaign was continued, 597,523 vaccinations were performed during the year and it is said that over 75 per cent. of the total population are now protected. Attention is being directed towards maintaining immunity by vaccinating all children at schools inspected by Medical Officers.

Trypanosomiasis.—During the year under review only 728 new cases with 14 deaths were reported. The decline in incidence by comparison with 1936 experience is striking but it is noted that the disease remains a major problem in the West Nile District where 700 of the total cases and 8 deaths occurred during 1937. The Koch River area of the West Nile District has suffered such serious depopulation through the gradual voluntary movement of the people southwards, that it is doubtful whether the small numbers of inhabitants remaining will be sufficient to maintain the clearings at the river crossings. The movement of people to new areas has served to increase the incidence of trypanosomiasis in those areas, and has introduced new difficulties and problems to be dealt with. Control measures were maintained as previously described (see this *Bulletin* 1936 Sapp. p. 61) particular attention being paid to the experimental rod-clearings which are clearings 10–20 yards wide along the banks of a stream designed to reduce fly density to limits within which the risk of infection becomes very small. The pass system allowing natives to travel between Uganda and the Sudan along certain defined routes, was introduced during the year and has

functioned successfully. Illicit movements of people have been converted into controlled movements with examination of travellers at certain gland posts. The pass system over the Tanganyika Uganda border is being maintained.

The Government Entomologist completed his tsetse fly surveys of the Gulu District. It was recommended that re-population of the restricted areas must be carried out gradually and under strict administrative control. The clearings in the West Nile and Madi areas (Northern Province) were also visited.

Cases of *tuberculosis* (all forms) among in and out patients dealt with at Government hospitals totalled 613 and of these 520 were cases of the *pulmonary* type of the disease. Hospital in-patient cases were pulmonary tuberculosis 293 with 92 deaths other forms of tuberculosis 57 with 20 deaths. The investigations of Dr CARMICHAEL, Senior Veterinary Research Officer were continued. During the year 51 specimens of sputum from phthisis patients were examined the causal organism in all cases being of the human type. It is observed that among upwards of 250 specimens of sputum examined up to the end of 1937 four were caused by the bovine type of bacillus. With regard to other respiratory ailments the *pneumoniae* were responsible for 2 038 cases and of these 1 685 were treated as hospital in-patients and 369 died. *Bronchitis* was responsible for 6 777 cases of which 439 were in patients and 6 died.

At Government hospitals 102 patients were treated for *typhoid fever* with 31 deaths, and 8 for *paratyphoid fever* with 1 death. A small epidemic which broke out in Kampala was traced to a polluted water supply. A piped water system was brought into use and the outbreak ceased within 14 days. *Dysentery* gave rise to 2 023 cases with 58 deaths the distribution of types of infection being amoebic 652 bacillary 281 and unclassified 1 090. It is also noted that the returns show 6,231 cases of *diarrhoea and enteritis* and 29 147 cases of *other diseases of the digestive system*.

Helminthic diseases especially infections with *ascaris* and *ancylostoma* are said to occur widely. Infected persons are treated with anthelmintic drugs but re-infections are frequent by reason of insanitary habits. Preventive measures are directed mainly towards the provision of latrines and educational propaganda. Of *ankylostomiasis* 1 761 cases were recorded during the year. The results of stool examinations by Medical Officers in seven areas showed infection rates ranging between 23 and 77 per cent. The condition though widespread is said to be the cause of little disability. *Taeniasis* is common in the Western Province and in districts where animal husbandry is an important industry. 2 034 cases were dealt with in Uganda during 1937. *Dracontiasis* of which 539 cases were recorded, is again said to be confined to the Nilotic districts of the Northern Province. Efforts are being made to provide protected water supplies. *Ascariasis* gave rise to 861 and *schistosomiasis* to 126 cases during the year under review. No cases of *filariasis* were treated in hospitals but *Onchocerca volvulus* is said to be extremely common in the Serubwa river area of Buganda while the infection is also said to be common round the head waters of the Nile.

Veneral Diseases show increased incidence. The incidence and distribution of *syphilis* and *gams* read as follows —

Province	Hospital Cases		Dispensary Cases	
	Syphilis	Yaws	Syphilis	Yaws
Buganda	11,961	892	19,230	2,062
Eastern	10,971	2,915	11,718	6,730
Northern	1,821	12,701	1,898	11,245
Western	2,189	4,673	8,045	22,937
Totals	26,962	32,254	40,891	43,074

The distribution of *gumma* is not given but the 16,236 cases treated are an increase over 1936 records. The results of treatment are said to be unsatisfactory owing to the irregular attendance of patients.

Leprosy.—At Government hospitals and dispensaries 1,067 lepers attended for treatment during the year under review. The Reports of the *Mission Leprosy Colonies* testify to the admirable work which continues to be carried out at these institutions. From these Reports the following details have been extracted:—

Leprosy Colony	Supervised by	Inmates
Bakula, Boga	Franciscan Sisters	89
Kyoga, Mengo		209
Banromu, Kipoti	Church Missionary Society	847
Kumi Children's Home, Tero	" "	354
Ongoro	" "	411

Other diseases mentioned in the Official Returns include 2,403 cases of *trachoma* which still remains an important cause of blindness in Uganda. Other diseases of the eye and ear-nose were responsible for 11,725 cases. Out of 53,289 cases of affections of the skin cellular tissue and organs of locomotion no less than 35,059 were due to tropical *myiasis*. This condition was commented upon in the 1936 Report (see this Bulletin 1936 Supp. p. 63*). For rheumatic conditions 20,681 patients received treatment, nephritis gave rise to 2,927 cases and 84 deaths while 48,725 patients were treated in the group external causes.

Scientific.—The Laboratory Report records that examinations carried out during the year totalled 50,464. The numbers of specimens received and examined are grouped under various headings, parasitology serology but findings are not recorded. The Report of the Government Entomologist has already been referred to in the above summaries.

Scientific papers published by members of the staff of the Medical Department include the following:—

LOWENTHAL (L.) A. A note on Tick-typus in the Eastern Province of Uganda.—*East African Med. J.* 1936, Vol. 13, p. 141.

— The place of logic in Medical Education.—*East African Med. J.* 1936, Vol. 13, p. 204.

— Diseases of the Skin in Negroes.—*Journal of Tropical Medicine & Hygiene* from September 1936 to December 1937. A series of articles published at various times.

- LOHRENTHAL (L. J. A.) DE COURCY IRELAND (M. G.) and HOSKING (H. R.) A survey of Health and Agriculture in Teso Uganda.—Uganda Government Press, Entebbe
- GIBBINS (E. G.) Notes on the Breeding Habits of some House Frequenting Flies in Uganda.—*East African Med JI* 1937 Vol. 13 p. 318
- ROBERTS (C. E.) Peptic Ulcer in Uganda.—*East African Med JI* 1937 Vol. 14 p. 88
- BARRATT (R. E.) A Portable Steam Disinfector.—*East African Med JI* 1937 Vol. 14 p. 132
- An enquiry into Diet and Nutrition amongst Indian school children in Kampala with special reference to the Consumption of Milk.—*East African Med JI* 1937 Vol. 14 p. 199
- TROWELL (H. C.) Pellagra in African Children.—*Archives of Disease in Childhood* Aug 1937 Vol. 12. No. 70
- Financial—Expenditure on Medical Services during 1937 amounted to £178 500 a sum which represents 9.0 per cent of the total revenue of the Protectorate during the same year

TANGANYIKA TERRITORY (1937)

Tanganyika Territory consists of that part of former German East Africa which is administered under a Mandate by His Britannic Majesty. It lies between the Great African Lakes and the Indian Ocean, and adjoins Kenya and Uganda on the north, the Belgian Congo on the west, N. Rhodesia and Nyasaland on the south west and Portuguese East Africa on the south-east. The total area is about 365 000 sq miles. Dar-es-Salaam is the capital and chief port other important towns are Tanga, Tabora, Dodoma, Moshi and Arusha.

Introductory—The Report under review was written by Dr G. MACLEAN Deputy Director (Acting Director) of Medical Services during the absence on leave from the Territory of the Director of Medical Services (Dr R. R. SCOTT M.C.)

Vital Statistics—The 1937 estimate of the native population of the Territory was 5 140,368 persons. No reliable statistics of births or infant mortality are available. (The reader is referred to the comments of the Director of Medical Services in the 1936 Report on this Bulletin 1938 Supp. p. 64*)

The non Native population is estimated to number 42 147

European Officials resident numbered 986 with an average number of 611. Twelve were invalided and four died (three of the latter in England). **Asian Officials** resident numbered 1,225 with an average number resident of 898. Eleven were invalided and one died.

Mortality and Child Welfare Work—This work was carried on at five special Clinics (13 in 1936) by Government and Missionary societies some of the latter receiving financial assistance for the work from the Native Administrations. The volume of work dealt with at these centres during the year reads as follows:—

Examinations 3,800 new cases mothers 28,813 children 49 138

Deliverances of mothers 201 136 of children 296,815

It has long been recognised that considerable advance¹ in the training of African women for maternity and child welfare work cannot be made until numbers of literate candidates become available. The Report goes on to say "Tradition which indicates matrimony as the normal goal of an African girl militates against her entry into a career wherein matrimony would be a complete hindrance or at least a paramount distraction. In these circumstances missions which influence the whole lives of their adherents are in a better position than is Government to undertake this training though results which do in fact include the provision of a certain number of midwives are stated to be disappointing on the whole compared with the efforts which are expended. The numbers of African girls attending the Government schools are rising and at 418 in 1936 were nearly three times the numbers in 1931. The Medical Department is training a few midwives at its maternity and child welfare clinics and from experience gained will be in a position to take advantage of increased literacy in due course."

It appears that extended midwifery work in the future must rely largely upon the services of women more elderly than unmarried girls, and in order that these more elderly candidates may have the qualification of literacy it is necessary that they shall have been schooled in their youth. At Tabora school, and at one mission, girls are now being instructed in elementary hygiene and the care of infants, and in later life it may be possible for the services of some of them to be utilized.

School Hygiene—The only reference to this important branch of work appears in the Northern Province Report, viz "Terminal examinations were made of all pupils at Arusha European School and fortnightly visits of inspection were paid to the African Government School at Old Moshi."

Public Health Sanitation etc—Though more funds were available for medical work in 1937 no substantial extension of services was undertaken since all branches of work demanded increased expenditure owing to growing demands and the increased popularity of services. The provincial system of administration (see this Bulletin 1938 Supp. p. 65) is said to be proving its value. It permits a readier exchange of ideas, makes for standardization where this is desirable, and provides better supervision of the smaller units. It is more efficient than a system of direct central control but no cheaper.

The extensive anti-malarial works in progress at Dar-es-Salaam (see this Bulletin 1939 Vol. 36 p. 367 and 1938 Supp. p. 65*) were continued and in all Provinces antimalarial measures figured prominently in the programmes of preventive activities. The Anti-Malaria Engineer visited various stations and at Iringa prepared a scheme for dealing with anopheline breeding places. The need for a sewerage system in Dar-es-Salaam is again emphasized. The bore-hole latrines constructed in the native town have proved unsatisfactory owing to the collapse of the sides due to the sandy nature of the soil. Experiments are being made with various types of lining. Constructional work in connexion with the Tanga sewerage scheme was continued and is expected to be completed in 1938. In Iringa township (Southern Highlands Province) all premises have been provided with latrines. The only references to water supplies appear

in the Laboratory Report. Bacteriological examinations of samples from various sources were made and reported upon. The Dar-es-Salaam supply received special attention with regard to deposits and growths occurring in the mains results of examinations are described and recommendations submitted with a view to improving the supply. *The health of labourers* on sisal estates gave rise to considerable anxiety. The results of examinations of persons who present themselves as potential labourers indicate that a sub-normal state of health from under nourishment and parasitic infection are not uncommon. The state of *nutrition* of the general population received special attention. The investigations of the Committee appointed to report and advise on human nutrition in the Territory demonstrate how incomplete is available knowledge of the problem as it affects Africans in Tanganyika. (The Report of this Committee was published towards the end of 1937). The subject of *native housing* was discussed in an illustrated pamphlet under the title of *Inexpensive Burnt Brick Houses for Natives*. This pamphlet was prepared by Mr A. T. CULWICK (District Officer Ulanga see this *Bulletin* 1938 Supp. p. 71*) published by Government and distributed to officials missions etc. *Legislative measures* enacted during the year in the interests of public health included ordinances concerned with the better control of milk supplies recruitment of labourers anti mosquito work infectious diseases pharmacy poisons lunacy etc.

The education of the public in hygiene continued along lines previously described.

Port Health Work—During the year 1 985 steamers and 4 461 dhows were given pratique at the 12 different ports in the Territory. In June 1937 the regular England South Africa *flying-boat service* was inaugurated by Imperial Airways calls are made at Dar-es-Salaam and Lindi and 258 flying boats were inspected at these ports. *The Air Navigation (Customs Aerodromes) (Amendment) Directions* 1937 add Bukoba and Kigoma to and delete Tabora from the list of customs aerodromes. An air port isolation hospital has been provided at Bukoba.

Hospitals Dispensaries etc—The increasing popularity of hospitals and dispensaries makes a constantly growing demand upon the resources of the Medical Department it is observed that during the year under review 4 921 more in-patients and 23,574 more out patients were treated than in 1936. There are 58 hospitals with bed accommodation for 2 140. European Hospitals are established at ten stations in seven provinces but in ten districts with over 100 Europeans and in two with over 200 there is no European hospital.

A new hospital with accommodation for 25 in patients was erected at Usangi (Northern Province) by the Native Authorities improvements were carried out at the hospitals at Malangali and Mbeya, and improved European accommodation is under construction at Chunya (these three stations are in the Southern Highlands Province).

Arrangements are being made to erect private hospital wards for Africans in some of the larger towns into which only paying patients will be admitted.

There are 38 *Medical Department Dispensaries* and 285 *Tribal Dispensaries* during the year 27 dispensaries were closed and 15 new tribal dispensaries were opened.

The volume of work dealt with at all treatment centres during 1937 may be summarized as follows —

Item	In-patients			Out patients	Tribal Dispensaries
	Admitted	Treated	Died		
Europeans	1 673	1 680	18	3 411	—
Africans and Others	30,807	41 408	2 134	618 179	573,987
Totals	41 480	43 088	2,152	621 590	573,987
Treated by —	1,325	1 395	52	159 801	—
African Dispensaries	2,919	2,930	15	60 078	—
Missionaries					

At the Dodoma and Lutindi *Mental Hospitals* 81 patients were admitted, 28 were discharged one escaped, 42 died leaving 210 in-patients under treatment at the end of the year. At the Dodoma institution 4 new single-bedded wards for males and 6 for females were added during the year but more accommodation is still urgently needed.

Drugs and equipment continue to be supplied by Government to *Missionary Societies* undertaking the care and treatment of the sick and good work continues to be carried out by these bodies. Special mention is made of the maternity and child welfare work carried out by the Church Missionary Society and by the work of the Lutheran Mission in rural areas.

The training of Africans is regarded as one of the chief functions of the Medical Department for it is said that many of the conditions and treatments can be dealt with by trained African personnel at the present time there are not enough educated Africans to meet the demand, but steps are being taken to provide additional educational facilities. Higher grade tribal dressers (*Medical Auxiliaries*) are being trained at five centres where there is accommodation for a total of 60 students, and arrangements have been made for the opening of an additional tribal dresser school at Tanga. The curricula for African dispensers and tribal dressers are given in detail.

Six candidates for appointment as *urban sanitary inspectors* were under training and three were successful at the qualifying examination. Nine candidates are being trained at two hospitals of the Lutheran Mission for rural medical work.

With regard to general *morbidity experience* during the year under review selected diseases are commented upon in the text of the Report while disease incidence in general may be studied from the classified returns. The notes which follow briefly summarize some of the principal menaces to life or causes of disability recorded.

Malaria was responsible for 57,884 cases and of these 5 060 were treated as in-patients and 102 died. The distribution of types of infection reads, *benign tertian* 822, *quartan* 45 *subtertian* 31,272 and unclassified 25 725. Of the total recorded cases 891 occurred amongst Europeans with 2 deaths. 785 were subtertian infections. *Blackwater fever* accounted for 51 cases and 18 deaths ten of the cases and two of the deaths occurring amongst Europeans. Mention has been made

of the anti malarial work in progress (see *Public Health* above). It remains to say that the final reports on Malaria Research of the Malaria Research Officers are in course of printing (see this *Bulletin* 1938 Supp p 67* and 1939 Vol 36 p 126). Provision has been made in the 1938 estimates for the appointment of a Medical Officer of specialized rank to be employed on the investigation and control of mosquito-borne diseases. This officer will assess the value of the measures taken as a result of the recommendations made during the malaria research survey.

Laboratory Reports present the following details of blood films examined during 1937 —

Laboratory	Blood films examined	With malaria parasites
Dar-es-Salaam	2 483	627
Sewa Hadji Hospital (Dar-es-Salaam)	7 094	1 439
Mpwapwa	889	360
Tanga	3,229	936

During the year the following papers on malaria were published —

SPRIS (R. C) Some observations on malaria in the Northern Province of Tanganyika with special reference to immunity. (Submitted as a thesis.)

WILSON (D B) Colonial Development Fund (Malaria Research Scheme) Report of the Malaria Unit Tanga 1933-34 together with the report on a study of malaria in India.

— & WILSON (M E) The manifestations and measurement of immunity to malaria in different races — *Trans Roy Soc Trop Med & Hyg* 1937 Vol 30 pp 41 431-448

Smallpox remains endemic in the Southern Province where 1 462 cases with 28 deaths were reported. Progress was made with the vaccination of the general population and over 102 000 vaccinations were performed. A small outbreak also occurred in Morogoro district (Eastern Province) but was readily controlled and only 9 (non fatal) cases were recorded, the infection being traced to immigrants from the Southern Province. Seven cases were also reported from the Southern Highlands Province with three deaths.

Cases of cerebrospinal fever occurred in every province except the Central and it is said that in the Territory as a whole 265 cases and 125 deaths were recorded. The most serious outbreak was in the Kilosa district of the Eastern Province where between September and November 116 cases and 55 deaths were notified. The infection is believed to have been introduced to some districts by imported labour from the Ruanda Urundi Mandated Territory (where a large scale outbreak was reported) and restrictions were thereupon imposed on recruiting of labour. Arrangements have been made for the provision of a travelling laboratory in order that subsequent outbreaks may receive earlier and fuller investigation on the spot.

Two serious outbreaks of plague occurred during the year the first in the Singida district of the Central Province where 61 cases and 17 deaths were reported. This outbreak was brought under control within a few weeks of the onset in February. The second was a more

The volume of work dealt with at all treatment centres during 1937 may be summarized as follows —

Item	In-patients			Out-patients	Total Dispensaries
	Admitted	Treated	Died		
Europeans	1 673	1 660	18	3 411	—
Africans and Others	39 807	41 403	~134	618,179	573,887
Totals	41 480	43,063	152	621 590	573,957
Treated by —	1 323	1,391	82	159,601	—
Africa Dispensaries	~919	~930	15	60 078	—
Unaries					

At the Dodoma and Lolundu Mental Hospitals 81 patients were admitted, 28 were discharged, one escaped 42 died, leaving 216 in-patients under treatment at the end of the year. At the Dodoma institution 4 new single-bedded wards for males and 8 for females were added during the year but more accommodation is still urgently needed.

Drugs and equipment continue to be supplied by Government to Missionary Societies undertaking the care and treatment of the sick and good work continues to be carried out by these bodies. Special mention is made of the maternity and child welfare work carried out by the Church Missionary Society and by the work of the Lutheran Mission in rural areas.

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With regard to general work, review selected diseases are commented upon in the text of the Report while disease incidence in general may be studied from the classified returns. The notes which follow briefly summarize some of the principal menaces to life or causes of disability recorded.

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Africans and Others	39,807	41 406	134	618 179	573,887
Totals	41 480	43 066	147	621,590	573,987
Treated by —					
African Dispensaries	1 323	1,365	5	159,801	—
Missionaries	919	~830	15	60,078	—

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Two serious outbreaks of plague occurred during the year the first in the Singida district of the Central Province where 61 cases and 17 deaths were reported this outbreak was brought under control within a few weeks of the onset in February. The second was a more

serious epidemic and was the cause of serious dislocation of trade for some months. The town and port of Mwanza in the Lake Province were first infected climatic conditions favoured the spread of the disease which first appeared in February and continued until August in the Province as a whole 72 cases and 47 deaths were notified. As a result of the outbreak a good deal of reconstruction work was carried out in Mwanza town—rat-proof godowns were built and some slum areas were cleared. Two sporadic and fatal cases were also reported from the Iringa district of the Southern Highlands Province. The Medical Department prepared and distributed Medical Pamphlet No 4 entitled *P plague in Tanganyika Territory*.

At the Dar-es-Salaam Laboratory 2,808 rat spleens were examined for the presence of *P. pestis* all gave negative findings. Typhus is not mentioned in the text of the Report (see this *Bulletin* 1938 Supp. p. 68*) but the classified returns show 8 non-fatal cases 4 of these being treated as in-patients. Of relapsing fever 1,612 cases were reported 504 were hospital in-patients and 17 died. No case of yellow fever was recorded. The usual *Aedes* index table is presented it being stated that the figures for Dar-es-Salaam may be accepted with some confidence though the figures for other towns are of little comparative value.

One hundred and five cases of typhoid and twelve of paratyphoid fever were treated during the year. 83 of the typhoid and all the paratyphoid cases were treated as in-patients with 21 deaths (20 due to typhoid). The centres showing the largest number of enteric cases were Morogoro (Eastern Province) 33 with 6 deaths, Tanga (Tanga Province) 11 with 4 deaths and Mwanza (Lake Province) 8 cases 5 deaths. 4 non-fatal cases of paratyphoid were also treated at Mwanza. At the Main Laboratory Dar-es-Salaam where 260 samples of blood serum were examined 81 agglutinated *Bact. typhosum* 6 *Bact. paratyphosum* 4 *Bact. paratyphosum B* and 3 showed both typhoid and paratyphoid infections. Dysenteric cases numbered 1,918 of which 793 were amoebic. 185 bacillary and 950 unclassified infections. Of the total cases recorded 525 were treated as in-patients and 51 died.

Mention has been made of the attention devoted to problems of nutrition (see *Public Health* above). In the Morogoro District of the Eastern Province *nutritional diarrhoea* assumed somewhat serious proportions and during the year 174 cases with 108 deaths were reported. Sufferers were mainly imported labourers on the local sugar estates. Factors responsible for the condition included, recruits of poor physique unsuitable diets, poor housing, and inadequate medical facilities. Steps have been taken to deal with these matters and bring about improvement. In the Lupia Goldfields area (Southern Highlands Province) 383 cases of scurvy were reported but only one death was ascribed to this cause. At the Tabora Hospital (Western Province) 43 cases of beriberi were dealt with while in the Territory there were 63 cases and 3 deaths due to this condition.

The incidence of *elephantiasis* continues to diminish (see this *Bullet.* 1938 Supp. pp. 68–69*). During the year 300 new cases were reported 168 of these from the Western Province alone. In the Central Province (6 new cases) the systematic clearing of bush was

continued and 17½ square miles cleared during the year. From the Lake Province 51 new cases were reported. The 1936 outbreak in the Southern Province appears to remain circumscribed. 75 new cases were reported but it is not claimed that all cases are reported. A general survey is being carried out in preparation of closer control of the disease in the affected area. In the Western Province about 1 500 families were moved into new concentrations and about 150 other families moved into old settlements (see this *Bulletin* 1938 Supp p 68*). The incidence of the disease continues to decline. 168 new cases were recorded.

The research work of Dr J F Corson at Tinde continues (see this *Bulletin* 1938 Supp p 69*) while observations were carried out by Mr Eric BURTT on the ability of *Glossina brevipalpis* to transmit *T. rhodesiense* biologically. The titles of papers published on trypanosomiasis research include the following—

CALWELL (H G) The pathology of the brain in Rhodesian Trypanosomiasis—*Trans Roy Soc Trop Med & Hyg* 1937 Vol 30 No 6 pp 611-624

CORSON (J F) Are experiments with trypanosomes in laboratories in tropical Africa vitiated by accidental infection?—*Trans Roy Soc Trop Med & Hyg* 1936 Vol 30 No 3 pp 304-312

Experimental transmission of *Trypanosoma gambiense* by *Glossina morsitans* through monkeys—*Ann Trop Med & Parasit* 1936 Vol 30 No 4 pp 339-400

A second note on a high rate of infection of the salivary glands of *Glossina morsitans* after feeding on a reed bark infected with *Trypanosoma rhodesiense*—*Trans Roy Soc Trop Med & Hyg* 1936 Vol 30 No 2 pp 207-212

The influence of repeated transmissions in animals on the virulence of *Trypanosoma rhodesiense* and *Trypanosoma brucei*—*Ann Trop Med & Parasit* 1936 Vol 30 No 2 pp 211-220

Further observations on a strain of *Trypanosoma gambiense*—*Ann Trop Med & Parasit* 1937 Vol 31 No 2 pp 275-283

A note on the infectivity to man of a strain of *Trypanosoma rhodesiense* maintained in sheep—*Jl Trop Med & Hyg* 1937 Vol 40 pp 141-142

The virulence of *Trypanosoma rhodesiense* in relation to critical passage through *Glossina morsitans*—*Trans Roy Soc Trop Med & Hyg* 1937 Vol 31 No 2 pp 231-234

The use of isolated infective flies in transmission experiments with *Glossina morsitans* and *Trypanosoma rhodesiense*—*Jl Trop Med & Hyg* 1937 Vol 40 No 20 pp 248-249

A second note on the infectivity to man of a strain of *Trypanosoma rhodesiense*—*Trans Roy Soc Trop Med & Hyg* 1937 Vol 31 No 31 pp 263-266

The infectivity to man of a strain of *Trypanosoma rhodesiense* transmitted through sheep by *Glossina morsitans* and its resistance to human serum *in vitro*—*Ann Trop Med & Parasit* 1937 Vol 31 No 2 pp 285-291

Tuberculosis (all forms) was responsible for 3 056 cases with 166 deaths. 2 109 of the cases and 152 of the deaths were due to the pulmonary form of the disease. Of the total cases and deaths recorded 2 116 cases and 25 deaths occurred in the Northern Province. 1 370 of the Northern Province cases and 21 of the deaths being due to the pulmonary form of the disease. At Kibongoto in the Northern Province the first section of the Tuberculosis Village Settlement was brought

of two Missions receiving assistance from Government. At the Main Laboratory Dar-es-Salaam where 182 nasal and skin smears were examined 97 were positive with *Myco leprae* and at the Tanga Laboratory where 31 nasal smears were examined 22.5 per cent gave positive findings.

Veneral diseases—At Government institutions 23,374 cases of *syphilis* were treated but if cases treated at Mission centres are included the total becomes 31,348. Of *gonorrhoea* 10,712 cases were recorded and of other veneral diseases 1,725. Work is being continued on the differential diagnosis of veneral diseases at a number of centres. Cases of *yaws* treated at Government institutions and Missions totalled 110,819 and of this total 73,822 cases were recorded at Government institutions. Florid *yaws* is said to be frequently met with in some districts of the Southern Province. At the Main Laboratory Dar-es-Salaam 755 specimens of serum were Wassermann tested, 220 gave positive and 40 doubtful reactions. 785 Kahn tests were carried out with positive results in 224 and doubtful findings in 48 cases. At the Tanga Laboratory 49 per cent of the 253 Kahn tests gave positive results.

Scientific—In the appropriate sections above brief mention has already been made of the special research work carried out in connexion with *malaria*, *trypanosomiasis* and *tuberculosis*. So far as the four Laboratories are concerned continued staff shortage and the large increase in the volume of routine work during the year precluded any possibility of research work being undertaken though the Government Analyst Mr W. D. RAYMOND succeeded in continuing his investigations into arrow poisons, native drugs, etc. It is pointed out that there remain innumerable minor though important field problems of a local nature capable of solution by workers with experience of local conditions but such problems will continue unsolved while laboratory facilities are limited and laboratory staffs inadequate. In this connexion it is interesting to note that a mobile laboratory at present under construction will be equipped to deal with common bacteriological investigations at short notice. This service should prove invaluable provided a full time pathologist is appointed to conduct it.

During the course of the year 38,891 specimens were examined in the Laboratory and Research Division—an increase of 10,234 over the 1936 record of work. The more important specimens dealt with and findings recorded have been quoted under various headings in the preceding summaries of morbidity experience. It remains to say that on 1 March 1937 a clinical laboratory was established at Tanga and by the end of the year over 10,000 specimens had been dealt with these including 253 Kahn and 26 Widal reactions. The value of trained Africans is well illustrated at the Tanga Laboratory where the African in charge trained at the Dar-es-Salaam Medical School and General Laboratory is doing excellent work under the supervision of the Senior Medical Officer.

Financial—Total expenditure on Medical Services for the year under review amounted to £201,280. In addition the Colonial Development Fund provided £721 for the Tuberculosis Investigation, £2,640 for Sleeping Sickness Research and £3,203 for the Anti Malaria Works Dar-es-Salaam.

"the mental distress caused to patient and relatives by needless infringement of the taboos only adds to the reluctance of village women to seek help or enter the hospital," etc. Native midwives are allowed to be present at deliveries of their patients in the hospital, thus permission it is said, has done much to remove the antipathy of these professional African practitioners who might naturally be expected to be suspicious of and to resent anything which would lead to the loss of their means of livelihood, i.e. midwifery fees, while it is hoped that as observers they may acquire knowledge of European midwifery methods.

Government continued to collaborate with and subsidize the Missions undertaking maternity and child welfare work. At the centre maintained by the Church of Scotland Mission at Blantyre four women were trained as midwives during the year and two new infant welfare centres were opened. Native midwives are also trained at the Vlanda Centre of the Dutch Reformed Church. Eight girls are in training at Bandawe and at the infant welfare centre 3,805 attendances were recorded.

The figures below summarize the volume of work carried out at centres other than the African Hospital, Zomba, subsidized by Government—

	Mlanda Mission	Blantyre Mission	Jessies Centre
(1) Infants registered at Welfare Centres	532	208	48
(2) Confinements conducted	118	437	73

School Hygiene.—All European schools were inspected during the year and general health conditions of the pupils reported to be satisfactory. With regard to African schools it was hoped that at least one such school in each district would be examined during the year but the pressure of routine work prevented this program from being carried out, and only a small percentage of the schools were visited and 731 children medically examined. The Report under review describes the results of inspections carried out at five African schools—

The Central School Haronga where 251 boys and 38 girls were examined. Two early cases of leprosy were discovered.

Providence Girls School Mlango.—A high incidence of helminthiasis among the 167 pupils examined.

Kaura Mission School Dedza.—General improvement in physical condition etc. among the 108 pupils examined, due to adequate dietary and attention paid to personal hygiene.

Mission School Mlondos Fort Johnston.—Latrine accommodation insufficient. Pupils examined 107. Latrine accommodation given where necessary.

Catholic Institute Blantyre.—No considerable improvement noted in the condition of the 60 pupils examined.

The results of Medical Surveys (see hereafter *Public Health* also this Bulletin 1937 Supp pp 63-64 and 1938 Supp pp 72-73 76)

are presented in detail in a series of Tables in the Report under review. Results are assembled from seven areas in the Protectorate in three age-groups the first of which relates to children aged 0-10 years. haemoglobin estimations the results of blood film spleen urine and stool examinations are among the data tabulated.

Public Health Sanitation etc—Under the heading of Public Health Dr. Bedward Williams contributes an admirable account of the historical development of the health services of Nyasaland, reviews the work performed by the Medical Department and progress made during the past 25 years, and submits recommendations for the future development of public health work in the Protectorate. This valuable section of the Report should be read in its entirety for limits of space in this *Supplement* prohibit the adequate summary which the contribution merits.

With regard to the work of the Department generally it is said that there is little that is new to record. In the larger townships the disposal of night-soil and rubbish has been satisfactorily dealt with, water supplies installed, drainage schemes carried out and other sanitary improvements effected. But in the rural areas difficulties of a very special nature are encountered while the lack of trained sanitary staff European and African tends to retard progress. Nevertheless that the arduous and self-sacrificing efforts of Medical Officers have in many instances been successful in bringing about notable improvement in several areas is evident from the extracts quoted from the reports of Medical Officers as for example—

Fort Johnston—A determined effort was made to commence the important task of rendering the natives really used to the idea of latrines as part of their ordinary life and not a meaningless ritual forced upon them. The idea was to have finally a latrine for every hut. No labour was provided. No compulsion of any kind was used. explanatory talks were given.

Nearly 200 latrines are in use and construction is still going on.

Dedza—The degree with which advice has been followed with regard to sanitary matters varies in direct proportion to the character and capability of the Native Authority concerned. Kachindamoto's area is the most satisfactory. A mass bookworm campaign was carried out. A propaganda meeting was attended by some 300 natives.

Dowa—Of Sendeza it is said. Some sanitary work has been done. The village headman is helpful and the local school teacher helps him. New houses constructed and latrination is complete.

Kola Kola—Vaccinators have done good work in rural sanitation.

Of the Protectorate as a whole it is noted that increased attention has been given to the protection of water supplies and that the boring of wells has been undertaken by the Geological Department.

The objects envisaged by the *Medical Surveys* to which reference has been made above and in previous issues of this *Supplement* are (a) to bring Medical Officers into closer contact with village life and (b) to obtain by actual examination of the inhabitants of selected areas a knowledge of the population, births, deaths and morbidity etc. of such areas. These surveys have proved conspicuously successful and during the year under review enquiries were carried out in seven areas. In three areas it was found possible

to undertake surveys (a) among villagers resident at lake level, and (b) among others living at an altitude of over 3 000 feet. The results of these investigations are set out in three age-groups in a series of Tables (see above also *School Hygiene*) together with the commentaries on results by the Medical Officers conducting the surveys. The report of an additional survey conducted at the Jeanes Training Centre is dealt with separately as it relates to natives from many districts.

Inspections of labour conditions on estates were continued these visits have been instrumental in bringing about general sanitary improvements. The emigration of adult males to the Rand mines continues (see this *Bulletin* 1937 Supp p 65* and 1938 Supp p 75) with serious results so far as native social life is concerned—there is a lack of fit adult males for carrying on the routine work characterizing the daily lives of the people while returning emigrants bring with them the seeds of disease. While measures have been taken for the better care of repatriated labourers arriving in Niasaland, no information is available of the thousands of returning emigrants who do not present themselves for examination.

Housing and Town Planning schemes and *Food in relation to Health and Disease* are subjects of comment (see this *Bulletin* 1938 Supp p 75). Replies to the questionnaire on nutrition drafted by the Health Department and submitted to District Commissioners to Missions and certain educated Africans, and to Medical, Agricultural, and Forestry Officers were analysed and the results tabulated and embodied in a Memorandum presented to and adopted by the Native Welfare Committee. This Memorandum appears as an Appendix to the Report under review under the title of *A Review of the Present Knowledge of Human Nutrition in Niasaland*.

The scheme for the training of Africans had to be modified considerably owing to sickness among the nursing staff (see this *Bulletin* 1938 Supp p 76*). At the African Hospital, Zomba provision is made for the training of various grades of African personnel, male and female while at the Jeanes Centre the training of welfare community workers is undertaken.

Measures taken to spread the knowledge of Hygiene and Sanitation continued to be energetically implemented.

Recommendations and Proposals for Reorganization and Future Development of Health Services are discussed at considerable length (see also this *Bulletin* 1938 Supp p 73).

Port Health Work—The quarantine camp at Port Herald on the Beira Blantyre Railway continued to function during the year. 71 Africans were detained for vaccination, having been in contact with infectious disease etc.

Hospitals Dispensaries etc.—At present there are six Hospitals each with 50 or more beds, and nine with 30 beds. It is recommended that three of the 50-bed hospitals should be increased to 100 beds each with augmented staffs and equipment and that the 30-bed units might have accommodation reduced to 15 beds and be placed in the charge of African hospital assistants. Financial considerations render the construction of a new hospital at Zomba impossible. In the Northern Province the non-official European community provided the funds for the construction of a small cottage hospital at Lilongwe.

Government will maintain and staff this unit. As regards *native hospitals* no new buildings have been erected nor have any additions been made to existing institutions. There is a growing demand from the Native Authorities for the provision of additional *rural dispensaries*. During the past two years upwards of 23 applications were received for new dispensaries in some cases Native Authorities have provided the funds for the erection and maintenance of these units. The volume of work dealt with at hospitals and dispensaries during 1937 may be summarized as follows —

Race	Hospitals			Dispensaries Out patients
	In-patients	Deaths	Out patients	
Europeans	223	7	1,215	—
Africans and others	10 595	270	113 669	302,318

The commentaries upon general morbidity experience contained in the Annual Report under review are briefly referred to in the notes which follow.

Cases of *malaria* dealt with at hospitals and dispensaries totalled 15 774 the distribution by race and types of infection being as follows —

Type of Infection	Europeans		Africans and Others		Rural Dispensaries Out patients
	In-patients	Out patients	In-patients	Out patients	
Benign tertian	5	11	92	189	—
Quartan	—	1	32	113	—
Subtertian	2	41	527	717	—
Cachexia	—	1	46	50	—
Blackwater	—	2	—	—	—
Undefined	18	82	354	3 762	9 729
Totals	25	138	1 051	4 831	9 729

There were 22 deaths among Africans due to malaria and 2 cases of *blackwater fever* with 1 death among Europeans. The Government Entomologist has pointed out that although *A. costalis* is almost absent during the dry season it is overwhelmingly abundant during the late rains while the other common species *A. funestus* shows no numerical increase during the year. He also found that the infection rate among *costalis* was very much higher than in *funestus*. The usual *anti-malarial measures* were successfully employed and it is reported that as a result the mosquito nuisance has been abated to a large extent in some areas.

At the Government Laboratory Zomba 1,379 out of 4,827 blood films examined were found to contain malaria parasites the positive findings being *P. falciparum* 1154 *P. malariae* 189 and *P. vivax* 36. The reports of the Medical Surveys (see above) present the results of

blood film and spleen examinations at high and low altitudes in various areas.

Only 88 (non-fatal) African cases of *smallpox* were reported during the year 1935. Vaccinations were performed.

A somewhat serious epidemic of *cerebrospinal meningitis* occurred in the Southern Province and necessitated the promulgation of special rules under the Public Health Ordinance for the control of the movements of natives etc. The first case occurred in August and spread was rapid—altogether 780 cases were reported and of this total 603 occurred in the Mlanje District. Dr W. T. C. BERRY, the Medical Officer, recorded for special duty in connection with the epidemic contributes a detailed report which is presented as an Appendix to the Report under review.

Of *relapsing fever* 139 cases were notified. Of the total cases recorded 51 were dealt with in the Kota-Kota district alone where most of the cases gave a history of having slept in Government rest-houses—the importance of having these rest-houses constructed of vermin-proof materials is emphasized. The Medical Officer, Kota-Kota, also reports among the results of his *Medical Surveys* in the area the carrier of *relapsing fever* is to be found in every hut.

Only one (non-fatal) African case of *ariens fever* appears in the Hospital Returns, but 1,538 cases of *dysentery* were treated during the year and of these 62 occurred among Europeans. The distribution of types of infection was (a) *Europeans* amoebic 66, undefined 6, and 1,296 faecal specimens examined at the Government Laboratory 83 were positive for *E. histolytica*.

Tuberculosis is considered to be increasing though it is not known even approximately what the incidence of the disease really is. Of the 231 cases reported during the year 145 patients were suffering from the *pulmonary* form of the disease. Out of a total of 252 Nyasaland native labourers repatriated from Southern Rhodesia during the year 89 were stated to have had tuberculosis and of these 35 were said to have suffered from phthisis. With a view to obtaining more accurate information concerning the incidence of the disease surveys were carried out in three areas, and among 344 children examined by the dermal method using Moro's tuberculin ointment 31 gave positive reactions. It is said to be practically impossible to keep African patients in hospital for periods long enough to treat the disease effectively.

Of *ly. phlebotomus* only two cases were reported—both from the Kota-Kota district. The medical Entomologist, Dr W. A. LAMBORN, reports that the steady retreat of the tsetse in a northerly direction continues—he estimates that the flies have vacated approximately 400 square miles of country since 1927. Dr Lamborn discusses the probable causes which have brought about the continued diminution of the numbers of flies, and concludes that the decline must be due largely to the dearth of animal life on which the insects depend for their food—the opening up of large estates, shooting, organized hunts by natives etc.—have all played their part in scaring game animals which have withdrawn to the Reserve in the North. A survey for parasites of the tsetse was commenced with a view to determining to

what extent they may be responsible for the steady decline in the numbers of fly but first results suggest that parasites do not play an important part in bringing about the observed reduction

Helminthiasis—The following data relating to patients treated for helminthic diseases have been extracted from Hospital and Dispensary Returns—*ankylostomiasis* 12,242 cases *ascariasis* 2,231 *taeniasis* 161 *schistosomiasis* 7,487 and other helminthic diseases 342 giving a total number of 22,463 cases dealt with. These figures refer to Out patients only. It would appear that either in patient cases were first seen as out patients and not regarded as new cases if afterwards admitted to hospital or in-patient cases have been omitted in error from the total in the Report under review. The text of the Report specifically states 'The total number of cases treated was 22,463'. But in addition to the 22,463 out patients there were 1,845 non European in-patients and one European in-patient. The results of stool and urine examinations carried out in the course of *Medical Surveys* in various areas are presented in a series of tabular statements together with the commentaries of Medical Officers in charge of these investigations. The Medical Officer in charge of the survey of the North Nyasa District commenting on the high incidence of *schistosomiasis* in the area surveyed observes—

In this marsh *B. africanus* is prevalent. *Limnæa* were also found but in a search extending along the Lake shore from the River Songwe to Deep Bay (approximately 50 miles) I did not see a single *Planorbis*. It would appear that this mollusc is not the carrier of the disease in this district and another snail must be concerned.

In an Appendix to the Report under review Dr W. L. GOPSILL contributes an interesting account of the incidence in this area under the title of *Some Observations on Schistosomiasis in North Nyasa District*.

At the Government Laboratory among 1,078 specimens of urine examined 219 contained evidence of bilharzial infestation while the findings among 1,396 faecal specimens dealt with included *ancylostoma* 520 *ascaris* 27 *S. mansoni* 37 *E. histolytica* 88.

Of venereal diseases 3,324 cases were reported and of these 2,377 cases were of syphilis and 947 gonorrhoea. The out-patient clinic at Blantyre continued to function with fair success but subsequent attendances following first visits for treatment were disappointingly few. It is noted that a native nurse was posted to the clinic and 145 female patients paid a first visit. At Denza among 1,435 labourers examined only 28 were rejected on grounds of venereal disease. The finding is interesting in view of the common belief that venereal diseases are increasing. Hospital and Dispensary Returns also show that 2,960 cases of yaws were treated during the year under review.

Leprosy—The treatment of the disease in Nyasaland is carried out almost entirely by the Missions with the financial aid of Government. There are 12 clinics established throughout the country, the majority of the centres being in charge of qualified nurses. Approximately 648 lepers were under treatment at these clinics during the year 260 were admitted 96 were discharged, and 35 died. It is not known to what extent the disease is prevalent in Nyasaland, but it may be possible to obtain fairly dependable information during the course of the next census.

Among other diseases mentioned in the Report deficiency diseases were the subject of special investigation by the Medical Department the results of the enquiry being embodied in a Memorandum presented to the Native Welfare Committee (see above *Public Health*). Five cases of rickets 3 of scrovy 5 of beriberi and 48 of pellagra were recorded during the year. Rabies is said to have caused anxiety and to have "shown no signs of abatement" but no cases appear to have been recorded unless they have been included under the title "Injuries inflicted by animals (bites, kicks, etc)". Over 50 000 cases of ulcers among African patients and 43 781 cases of bronchitis were dealt with.

Scientific—The Report of the Government Pathologist is confined to a summary of the specimens received and examined at the Government Laboratory and findings recorded. Altogether 8 058 specimens were dealt with the principal findings have been referred to in preceding sections of this summary. The Annual Report of the Medical Entomologist has also been quoted in the section (*trypanosomiasis* above. In addition to the tsetse fly surveys, Dr Lamborn continued his survey for rodents and their ectoparasites and his investigations of the breeding habits of *Tabanidae* and commenced a study designed to determine whether *Myco tuberculosis* undergoes any morphological changes within the fly *Musca sorbens* and whether the organisms remain viable after they have been ingested by the fly.

Four Special Reports appear as Appendices to the Report under review viz:—

- (1) Post-Operative Complications in the Natives of Nyasaland, by Dr C H. HOWAT
- (2) Cerebrospinal Fever in Nyasaland by Dr W T C BERRY (Reviewed in *Bulletin of Hygiene* 1938 Vol 13 p 867)
- (3) Some Observations on Schistosomiasis in the North Nyasa District, by Dr W L GOSALL (Reviewed in this *Bulletin* 1939 Vol 38 p 33)
- (4) The Native Welfare Committee Report on Nutrition (Reviewed in *Bulletin of Hygiene* 1938 Vol 13 p 931)

Three of these Special Reports have already been the subject of brief reference in the preceding notes. It remains to say that Dr Howat's contribution discusses four common complications of operation viz post-anaesthetic vomiting infection of the surgical wound, retention of urine and pulmonary lesions—bronchitis, pneumonia etc. His surgical practice in Nyasaland leads him to conclude that these complications are encountered rarely or not at all in the Protectorate.

Financial—Actual expenditure on Medical Department services during 1937 amounted to £51,322 as against an approved expenditure of £52,712.

ZANZIBAR PROTECTORATE (1937)

Zanzibar Protectorate off the East African Coast comprises the islands of Zanzibar and Pemba and the islets within their territorial waters. Zanzibar is about 53 miles long by 24 miles broad with an area of 640 sq miles. Pemba to the north-east of Zanzibar is about 42 miles long by 14 miles broad. The only town of importance is Zanzibar Town.

Vital Statistics—Published figures are compiled from returns submitted by the *Mudirs* through the Provincial Administration and in the words of the Report cannot be regarded as even approximately correct for registration is incomplete. The principal facts are given as follows —

Estimated Population	Registered Births	Birth Rate	Registered Deaths	Death Rate
243 135	4 139	17.0	4 026	16.9

The *infant mortality rate* for the year is not stated but it is observed that rates in specially defined areas in 1937 were 141 for natives and 159 for Indians per 1 000 live births. The *maternal mortality rate* of 9.2 per 1 000 live births relates principally to the town of Zanzibar for the Protectorate as a whole it is believed this rate would be greatly exceeded. The investigations of the Welfare Clinic are being continued and it is hoped that by the end of 1938 sufficient data will have been assembled to provide reasonably dependable infant and maternal mortality rates.

European Officials resident numbered 110 with an average number resident of 70. One death was recorded. *Non European Officials* resident numbered 462 with an average number resident of 423. Five were invalided but no deaths were recorded in this group.

The most common causes of sickness amongst Europeans and Non European officials were *influenza, malaria and diseases of the respiratory and digestive systems*.

Maternity and Child Welfare Work.—The year 1937 saw the results of the first full year's work of the Lady Medical Officer and her staff (see this *Bulletin* 1938 Supp. p. 81*). During the year the 7 310 new patients registered at the special day clinics made 45,308 attendances for treatment of special significance is the fact that the proportion of women in Zanzibar attending hospitals for treatment rose from 22 per cent in 1935 to 40 per cent in 1938 (when the clinic started) and to 59 per cent in 1937. In the Pemba Hospitals where there is no woman doctor the proportion of women patients has remained roughly constant at 23 per cent. The striking success of the venture in Zanzibar will be followed by the appointment of a second woman doctor in 1938 with extension of similar activities to the island of Pemba and to rural areas in the Protectorate when financial resources permit. Meanwhile at the hospitals at Chake Chake and Wete in Pemba a start has been made by providing women's out-patient departments separated as widely as conditions permit from the men. In commenting upon these new departures and of the success of the initial venture in Zanzibar Dr W Leslie WEBB, Director

of Medical Services, quotes from the memoirs of one of the daughters of the first Sultan of Muscat and Zanzibar and published in 1880 in which the enlightened lady observed that if a female physician could be brought to undertake service in Zanzibar she would be able to do more good than ten medical men combined.

At the three *Infant Welfare Clinics* held weekly attendances totalled 3 812 and at the *Adult Natal Clinic* 817. During the year under review cases of diseases of the *puerperal state* dealt with in Government Hospitals numbered 302 as compared with 115 in the preceding year. Clinics were also actively functioning during the year at four rural dispensaries with encouraging results.

The *Zanzibar Maternity Association* is no longer under the control of the Medical Department (see this *Bulletin* 1937 Supp p 70* and 1938 Supp p 81) and returns of the work of that organization will no longer be included in the Annual Medical Report.

School Hygiene—A most satisfactory feature of the year's work was the extension of the School Medical Service. During 1937 over 1,800 children were medically examined and nearly 1,300 were seen by the Dental Surgeon—the largest numbers of school-children ever dealt with in a single year in the Protectorate. The service is well established in both islands and fewer difficulties are met with for examinations are willingly accepted by both parents and children. The results of these examinations are set out in considerable detail in the Report under review but for present purposes it must suffice to summarize briefly the principal findings. In both Zanzibar and Pemba malnutrition is grossly evident amongst rural African children, less so among rural Arabs. The town-dwelling African child, less so town Arab child. Malnutrition is less evident amongst pupils at the Government girls' school than amongst male children. With one or two exceptions the cleanliness of school-children leaves much to be desired—scabies is common in the rural schools owing to the filthy condition of the cotton garments worn by pupils. In all schools dental caries is very common—the rural areas with *ascariasis* common defects being most common in areas where malnutrition is evident. *Angiodysentria* is said to be universal in the rural areas and *syphilis* has regularly been carried out treatment for warts and *syphilis* has produced satisfactory results but for ankylostomiasis results have not proved so encouraging.

owing to the frequency with which re-infestations occur. Lectures on health subjects are given to school-children special attention being devoted to talks on the dangers of hookworm malaria scabies, etc. and how these diseases may be avoided.

Public Health Sanitation etc.—Dr W. Leake Wynn observes Adequately trained native staff still remains one of the crying needs of the department and it is difficult to see how any material extension of service can be effected without considerable cost until it is provided. In 1935 Government approved a scheme for the formation of a Zanzibar Native Medical Service through the framework of which rural Africans could be given a comprehensive training in medical work with a view to subsequent absorption into the Department as

rural dispensers nurses and midwives. However at that time there were no rural Africans of the required educational standard available for training though subsequently with the co-operation of the Education Department arrangements were made for the further general education of a number of boys and girls the first of these classes of boys will be available for Medical Department training in 1940 and of girls in 1942.

The anti malarial survey conducted by Dr D D McCARTHY (see this *Bulletin* 1938 Supp p 84*) under a grant from the Colonial Development Fund was completed in September 1937 and it is expected that his Report will be published early in 1938. Preventive measures continue to be actively carried out along the lines described in previous issues of this *Supplement*.

Present-day methods of *sewage disposal* were described in earlier Reports and referred to in this *Bulletin* 1937 Supp p 72* and 1938 Supp p 82*. The posting of three locally trained African Sanitary Inspectors for permanent employment to rural areas in connexion with a scheme for providing *bone hole latrines* for the whole population in those areas marks the first serious attempt to cope with the problem of rural sanitation. Scavenging services and methods for the removal and disposal of refuse continued along lines previously described.

In Zanzibar *water supplies* were ample and satisfactory where water-mains are laid but in the native town the population have to employ water carriers to bring water to their houses. In Pemba supplies to Chake and Wete were reasonably satisfactory but in Mkoani water is of poor quality and insufficient in quantity. The Public Works Department have carried out experimental borings and it is expected that the present unsatisfactory conditions will shortly be remedied. In rural areas water is still obtained from deep and shallow wells and from rivers. Sanitary Inspectors are required to supervise and endeavour to improve supplies in such areas.

Under the heading of *Housing and Town Planning* a somewhat detailed account is provided of general conditions and of attempts to bring about improvement so far as urban housing is concerned in Zanzibar and Pemba. Numerous surveys and inspections of properties brought to light many cases of unsatisfactory housing and steady pressure was maintained to persuade or enforce owners to effect necessary improvements. Rural housing conditions did not alter during 1937 it is said that though on the whole rural housing is not good there is little overcrowding.

As regards *foods etc* it is stated that the publication of a *Nutritional Review of the Natives of Zanzibar* early in the year served to focus attention on the subject for it was clearly demonstrated that native dietaries are invariably lacking in some essential foodstuffs to the detriment of the health of the people. The implementation of the recommendations made for the improvement of existing conditions must be a matter of time and governed largely by financial considerations (see also this *Bulletin* 1937 Supp p 72* and 1938 Supp p 83*).

Training of Native Personnel—A notable advance in the training of non European personnel was made when the systematic training of some learner Sanitary Inspectors (Indian, African and Goan) culminated in their examination under the auspices of the Royal Sanitary

Institute five satisfied the examiners. The training scheme is the first of its kind to be undertaken in East Africa. The training of rural dispensers was continued as usual.

Measures taken to spread the knowledge of hygiene and sanitation included lectures by Sanitary Inspectors to school-children and the general population the distribution of pamphlets devoted to explaining the meaning of simple health precautions lectures by Medical Officers, Health Exhibitions, etc.

The *Annual Report of the Dental Surgeon* is printed as an Appendix to the Annual Medical Report under review. It is stated that after four years of observation of the natives of Zanzibar Protectorate it is safe to affirm that over 90 per cent. of them suffer from dental disease. The Report comments at some length on oral conditions in the Protectorate discusses dental work carried out among school-children and supplies tabulated facts relating to the numbers of schools visited, pupils examined, etc.

Port Health Work—During the year 588 ships and 712 dhows entered the harbour and 1,531 immigrants landed. Routine services were carried out as usual, and nothing unusual in respect of Port Health work is reported.

Aeroplane traffic accounted for the arrival and departure of 347 planes carrying 384 immigrants and 267 emigrants. All aircraft arrive from Kenya or Tanganyika no quarantine restrictions of any kind are imposed and so far do not appear to be called for.

Hospitals Dispensaries etc—The numbers and distribution of Hospitals and Dispensaries in the Protectorate may be conveniently set out in the following manner—

Locality	Hospitals	Special Clinics	Dispensaries	Totals
Zanzibar Island —Town	4	2	2	10
District	2	—	19	21
Pemba Island —Town	2	—	—	2
District	1	—	7	8
Totals	12	2	28	42

The above figures include one European hospital and a Mental Hospital in Zanzibar Town, a Poor Home and a Leper Colony in Zanzibar District, and a Leper Colony in Pemba Island District.

At these institutions 4,673 in-patients were admitted during the year in-patient cases treated totalled 5,197 and 478 hospital deaths were recorded. Out-patients dealt with numbered 121,347 and among them 448,370 attendances were recorded, 219,398 being attendances at Dispensaries. Mention has already been made of the extension of medical facilities in the interests of women (see *Maternity* above) and of the proportions of female to male patients attending for treatment.

The only figures of value throwing any light on the incidence of disease in the Protectorate are the returns compiled at Government Hospitals and Dispensaries. The following notes briefly summarize the principal references contained in the Report under review to disease incidence during 1937.

Malaria patients treated at Government Hospitals etc. numbered 8,801 and of these 249 were in patients (7 died) and 8,552 were out patients. The distribution of types of infection among in patients reads *benign tertian* 28 *quartan* 1 *subtertian* 123 and unclassified 97 the corresponding figures for out patients being 457 22, 1,797 and 6,278 respectively. There were also 5 cases of *blackwater fever* two of these being treated as in patients. At the Pathological Laboratories Zanzibar and Pemba the following blood films were examined and findings recorded —

Laboratory	Blood Films	Positive findings			
		<i>P. vivax</i>	<i>P. falciparum</i>	<i>P. malariae</i>	Undefined
Zanzibar	9,378	253	1,252	26	563
Pemba	2,013	446	339	—	108

P. vivax and *P. falciparum* were found together in 22.

Reference has been made in the section *Public Health* above of antimalarial control measures and of the special survey completed in 1937.

No case of any of the dangerous infectious diseases was recorded (see this *Bulletin* 1938 Supp. p. 84*). During the year 8,805 anti-smallpox vaccinations were performed in Zanzibar and 1,918 in Pemba. One case of *relapsing fever* was reported but as *O. moubata* is not known to exist in Zanzibar or Pemba it is certain the disease must have been contracted outside the Protectorate. One fatal case of *cerebrospinal meningitis* was notified from Wete in Pemba.

Of the 22 cases of *enteric fever* notified 20 occurred in Zanzibar Town. At the Zanzibar Laboratory 18 out of the 113 samples of serum agglutinated *Bact. typhosum*. *Dysentery* was responsible for 58 cases and of these 36 occurred in Zanzibar (Hospital Returns record 61 cases of which 6 were amoebic, 24 bacillary, and 31 unclassified.) Among 142 faecal specimens examined *Bact. dysenteriae* Flexner was isolated in 26 and Sonne in 6.

During the year 214 patients were treated for *tuberculosis* (all forms) and of this total 182 were suffering from the *pulmonary* type of the disease. 45 of the 48 deaths were due to phthisis. New cases notified, nearly all of the *pulmonary* type, numbered 151 and of these 125 were in Zanzibar Island. The year's figures for the Walezo Tuberculosis Asylum were total treated 94, died 33, discharged 39. There were also 6,454 cases of *bronchitis* and 204 of *pneumonia*.

New cases of *leprosy* notified numbered 28 and the total cases treated 137. The two Leper Colonies at Walezo in Zanzibar and Makondeni in Pemba are well patronized by lepers who enter and reside there voluntarily (see this *Bulletin* 1938 Supp. p. 84*).

Helminthic diseases—Hospital Returns show that 12,202 cases of *ankylostomiasis* were dealt with during the year. The view is expressed that there can be no doubt that nearly the whole population of the island of Zanzibar is infected with hookworm. In an attempt to discover to what extent the application of proved methods of control is applicable in Zanzibar Government is to provide sufficient latrine accommodation in a selected area and by the end of the year six boring

machines were at work in the area under the charge of three African Sanitary Inspectors. Efforts are being made to popularize the use of latrines by constructing bore-hole latrines and providing cement tops free of charge at a cost to Government of 4 shillings each complete latrine and if the experiment proves successful it is hoped to apply the principle to the whole Protectorate. *Schistosomiasis* is said to be widespread in Pemba but less evident in Zanzibar intestinal forms of the disease are rare. During the year 578 cases were treated. An investigation of the problem was undertaken by a research worker from the London School of Hygiene and Tropical Medicine and by the end of the year the small carrier had been incriminated, and the fact ascertained that its distribution in the Protectorate is limited by certain definite factors. In the light of these discoveries it is hoped that measures may be devised for the complete eradication of the disease. At the two Laboratories the following findings were recorded following the examination of specimens of faeces and urine —

Item	Laboratory	
	Zanzibar	Pemba
Faecal specimens examined	6,328	868
Positive findings —		
<i>Ancylostoma</i>	2,608	408
<i>Ascaris</i>	433	29
<i>Trichuris</i>	842	48
<i>S. mansoni</i>	5	—
Urine examined	499	813
Positive findings —		
<i>S. haematobium</i>	162	129

Veneral Diseases — During the year 1 062 cases of syphilis 1 485 of gonorrhoea 65 of soft chancre and 4 183 of yaws were treated. It is stated that the figures for gonorrhoea give no idea of the incidence for almost every adult has the disease (see this *Bulletin* 1938 Supp p 85*). At the Zanzibar Laboratory the hahn test applied to 4,210 samples of serum gave 684 positive and 592 doubtful reactions.

Other diseases referred to in the Report included the following. It is said that *filaria* occupies a prominent position amongst diseases affecting natives. For ulcers 21,873 cases were dealt with. Among the 3,354 diseases of the eye treated were 83 cases of trachoma. Cases of *influenza* numbered 1 098 all were of a mild type and no deaths were reported.

Scientific — The Laboratories at Zanzibar and Pemba continued to function as heretofore and references to the work and findings recorded have been made under various headings in the preceding notes. During the year the following paper was published —

VASSALLO (S. M.) Duodenal Ulcer in Zanzibar — *East African Med. JI* 1937 Vol 14 No 3

Financial — Total expenditure on Medical Department Services amounted to £43,204 a sum which represents 9.7 per cent of the total revenue of the Protectorate.

SOMALILAND PROTECTORATE (1937)

Somaliland occupies the North-eastern horn of the African continent, jutting into the Indian Ocean on the south of the Gulf of Aden. The boundaries have been settled by agreements with France, Italy and Abyssinia. The chief ports are Berbera, Bulhar and Zeilah, and its area about 68 000 sq. miles, or one-sixth larger than England and Wales together.

Vital Statistics—The census figure for 1931 for all classes of the population is still used—a summary of the distribution by race reads: *Europeans and Whites* 68, *Natives (Somalis)* 344 700, *other natives of Africa* 458, *Arabs* 1 614, *Others* 543. As from the 1st July 1937 a praiseworthy experiment required tribal authorities to render monthly returns of births and deaths to District Officers. The first results of this departure are of interest:—

	Live Births	Stillbirths	Deaths
Berbera District	523	16	165
Hargeisa	450	—	210
Burao	14	—	—
Borama	633	9	140
Erigavo	19	7	33
Zeilah	159	19	87

Population figures for these districts are not included.

European Officials resident numbered 63, with an average number resident of 39; one was invalided home on sick leave before completing a tour of service, but no deaths were recorded. *Asiatic Officials* resident numbered 80, with an average number resident of 65; here again one was invalided home on sick leave before completion of a tour.

The vital records for Troops and Police for 1937 were as follows:—

Item	Number on Strength	Average Strength	Invalidings	Deaths
Troops (K.A.R.)	602	375	5	3
Police	654	624	17	2

Maternity and Child Welfare Work.—Nothing new recorded (see this Bulletin 1938 Supp. p. 87*) beyond the recommendation that a maternity and child welfare centre should be established (see *Public Health* below).

School Hygiene.—The position remains unchanged (see this Bulletin 1938 Supp. p. 87*).

Public Health Sanitation etc.—Dr J. C. R. BUCHANAN, Senior Medical Officer, was transferred for service with the Aden Government early in October, and no new appointment to the post of Senior Medical Officer was made during the year, though subsequently Dr P. S. BELL was appointed to the vacant post. In one section of the Report under review the aim of the Medical Department is questioned and the view is

expressed that the confidence of the native inhabitants has not yet been established. These views provoked a sharp reply from His Excellency the Governor who finally concludes "The Report reflects the greatest credit on the Senior Medical Officer and his staff and all concerned are to be congratulated upon the work which they have accomplished" (Dr Buchanan in an earlier Report refers to the difficulties met with in Somaliland (see this *Bulletin* 1938, Supp. p 88*))]

The references to general measures of sanitation are meagre. 15 *pit latrines* were constructed at Hargeisa and others are to be built in the same area. For other information the reader is referred to previous issues of this Supplement. In November a Standing Committee on Town Planning in Berbera was set up—the first meeting was held in December but no information is supplied of the results of this meeting or what schemes of work are envisaged by this Committee. Another Committee was appointed at the beginning of the year to survey human nutrition in the Protectorate. A Report was issued in February and recommendations included (a) That a system of milk distribution should be organized making supplies available for coastal areas (b) the establishment of a Maternity and Child Welfare Centre and (c) the establishment of a Central Laboratory. In May a Standing Committee was appointed on Human Nutrition "to co-ordinate and inspire the Government on this important matter".

Recommendations for future work envisage the establishment of a true Sanitary Service in the Protectorate latrines for the use of officers native servants in Berbera, and grading, re-surfacing and draining of the streets in the Town.

Five Appendices to the Report under review reproduce Ordinances and Notices enacted during the year in the interests of Public Health.

Hospitals Dispensaries etc—An addition to the list of Institutions providing for the treatment of patients is seen in the Abyssinian Refugee Camp Hospital established at Manjesh. The following statement summarizes the volume of work dealt with at all Hospitals during the year—

Hospital	In patients	Hospital Deaths	Out-patients
Berbera	786	22	9,332
Borama	702	18	4,837
Borao	620	18	8,628
Erigavo	98	6	3,813
Hargeisa	847	18	7,317
Spelsh	88	2	2,494
Zelsh	81	1	3,928
Manjesh (Aug-Dec)	289	12	5,200
Totals	3,601	92	45,445

It will be seen that even though an additional Hospital was functioning from August to the end of the year the numbers of in-patients and out-patients treated are fewer than those recorded during the previous year. This decline in treatments forms the

subject of special comment by the Senior Medical Officer who is of the opinion that the reason may be attributed to a reluctance on the part of natives to pay the small charges imposed for in-patient treatment (see this *Bulletin* 1938 Supp p 88*) and a belief that these charges apply to out patient treatments also (see also *Public Health* above) His Excellency the Governor does not subscribe to this opinion and points out that should a Somali who had lived at the expense of Government meet his death by accident much money would readily be found by his tribe to file and prosecute a claim for *dia* (blood money)

Having regard to the observations of the Senior Medical Officer the recorded figures for this or that disease can scarcely measure real incidence with any degree of accuracy. For example it is stated

A remarkable fall has occurred in the total number of cases of communicable disease treated by comparison with records for the previous three years.

Cases of *malaria* are said to have numbered 415 (see below) The fall in numbers cannot be attributed to failure of the rains for the rainfall figures are if anything higher than in previous years and it is added an immensely greater number of cases occurs than is recorded, the numbers shown merely representing those cases occurring in the neighbourhood of Hospitals or seen by Medical Officers on tour (see this *Bulletin* 1938 Supp p 88*) The incidence of the disease varies markedly in different parts of the Protectorate. On the coastal plain locally infected cases are almost unknown and the mosquito population is very small but in the south-eastern and south western parts of the country where rainfall is heavier the disease is liable to occur in widespread epidemics. Preventive measures of any value in these areas are at present impossible. During the year the direct sale of quinine to the native population at cost price was started but only 64 phials were sold. According to the classified Returns there were 319 in-patient and 415 out patient cases of malaria dealt with during the year. [Does this mean that 319 of a total of 415 cases first seen as out patients were subsequently admitted to Hospitals?] The distribution of types of infection among the 415 cases was *sub-tertian* 292 *benign tertian* 60 *quartan* 48 *cachexia* 14 and one unclassified case. At the Laboratory where 2965 blood films were examined, 179 were positive with *P falciparum* 91 *P vivax* and 62 *P malariae*.

One case of *smallpox* was reported from Hargeisa. It is believed the infection was introduced from Abyssinia. Active measures of vaccination were enforced in all areas, 3684 vaccinations were performed and no further cases occurred.

The measures taken at Burao for the removal of the town haafa to a new site and for the closure and destruction of certain coffee shops in the Camel Corps Lines appear to have been successful in bringing about a reduction in the numbers of cases of *relapsing fever*. In the whole Protectorate 488 cases were reported and of these 273 occurred in Burao (where in 1936 there were 618 cases).

A noticeable increase in the case incidence of *cerebrospinal fever* is recorded. Of the 16 cases dealt with 11 occurred in Hargeisa. In view of the suspicion that cases were being concealed, special Rules were issued empowering Medical Officers to enter premises examine

persons remove cases to Hospital, disinfect premises, etc. [These Rules are reproduced in detail in an Appendix and cited as The Contagious Diseases (Epidemic Cerebro-Spinal Meningitis) Rules, 1937.]

Six cases of *enteric fever* were diagnosed four of typhoid at Berbera and two (one each typhoid and paratyphoid) at Hargeisa. Of the 15 cases of *dysentery* recorded in the classified returns one was bacillary and for the remainder the type of infection was not determined. The returns also show that 677 cases of *enteritis* and 8318 of *constipation* were treated during the year (see this *Bulletin* 1938 Supp. p. 89.)

As regards *tuberculosis* 9 in-patient and 134 (in another place given as 143) out-patient cases of *pulmonary tuberculosis* were treated, and 60 in-patient and 131 out-patient cases of other forms of the disease. Other respiratory affections included the following —

	In-patients.	Deaths.	Out-patients.
Broncho-pneumonia	17	3	75
Lobar pneumonia	85	12	99
Bronchitis (all forms)	32	0	712

Eye diseases are a serious cause of disability. Hospital Returns show that 4,224 persons were treated for various eye affections and among the total were 3,325 cases of *conjunctivitis* and 149 of *trachoma*. For the latter condition 127 patients were treated at Hargeisa alone and the Report observes "The number of persons in the country actually infected must be of serious proportions."

Helminthiasis — A decline in the incidence of helminthic infections is noted and attributed to the cessation of the immigration of refugees from Abyssinia (see this *Bulletin* 1938, Supp. p. 89*). Only 140 cases of tape-worm infestation were recorded during the year.

Venereal diseases — The Hospital Returns supply the following data of cases treated during the year —

Syphilis			Gonorrhoea	Soft Chancres
Primary 90	Secondary 109	Tertiary 171	184	4

The numbers of cases of *syphilis* have increased from 220 in 1934 to 491 in the year under review. While little change is noted in the numbers of primary infections for each of the years 1934-1937 the latter stages of the disease have shown steady increase. This is especially true of congenital forms of *syphilis*. Having regard to these increases it is curious to note that the Laboratory Report records only 8 specimens of serum tested during 1937.

Four out-patient cases of *yaws* were treated during the year.

Other ailments mentioned with numbers of cases treated include the following — *Influenza* 543 *whooping cough* 63 *measles* 29. The deficiency diseases include *beriberi* 11 cases, *scurvy* 6 and *rickets* 5 while *pernicious* and other *anaemias* were responsible for 124 cases. *Skin diseases* of all kinds accounted for 8,342 cases and of these 5,854 were cases of *ulcers*. Affections produced by *external causes* totalled 7,356 and of these 4,427 were due to injury caused by blows.

Scientific—The Laboratory Report records that 5,936 specimens were received and examined during the year of these 2,935 were blood films (see *Malaria* above) and 378 were specimens of sputum of which 140 were positive for *Myco tuberculosis*. Nasal smears numbered 1 695 and 1 612 of these were positive with *Myco leprae* while among 128 urethral and vaginal smears 116 were positive with *N gonorrhoeae*. Twenty three Widal tests were carried out 8 reacted positively with *Bact typhosum* and 5 with *Br melitensis*. One out of five specimens tested gave a positive *Sachs-Georgi* reaction.

Financial—Total expenditure on Medical Services during 1937 amounted to £11 011 a sum which represents 5·2 per cent of the total revenue or 5·3 per cent of the total expenditure of the Protectorate during the same year.

RHODESIA

NORTHERN RHODESIA (1937)

Northern Rhodesia lies north of the Zambesi River with Tanganyika Territory and the Belgian Congo to the north, Nyasaland and Portuguese East Africa on the east, Southern Rhodesia and South-West Africa on the south and Portuguese West Africa on the west. The area of the Territory is estimated at about 287,950 sq miles and divided for administrative purposes into nine Provinces.

Vital Statistics—The only recorded facts presented under this title relate to European births and deaths and to European and Native Officials (see in this connexion this *Bulletin* 1937 Supp p. 79* and 1938 Supp p. 81*).

European deaths totalled 115—those under 5 years (16 in number) are classified in eleven age-groups—eleven infant deaths were recorded and these related to the 298 births registered give an *infant mortality rate* of 37·2 per 1,000 births. Total deaths are also classified by sex and cause of death, the latter according to a list of 38 titles.

European Officials resident numbered 616 with an average number resident of 517—three invalidings and four deaths were recorded. Of *Native Officials* 2,796 were resident, with an average number resident of 2,685—among this group 24 were invalided and 10 died.

Maternity and Child Welfare Work—At the European Hospitals, where 204 women were treated for *diseases of the puerperal state* 140 were cases of normal labour (138 admitted during 1937) while at Native Hospitals the corresponding numbers were 149 and 100 respectively.

The four *Welfare Clinics* (see this *Bulletin* 1936 Supp p. 73*) continued to function as usual—no details of the work dealt with at these centres are supplied. During the year arrangements were made for great increase in welfare work in the copper-belt. Each of three big copper mining concerns undertook to employ a Welfare Sister for work among dependants of employees, while Government undertook to employ a Welfare Sister for work among natives in each of the public township locations adjoining mine townships. This means the employment of six Welfare Sisters in the copper-belt. It is anticipated that similar activities will be started in Broken Hill.

School Hygiene—All European schools and scholars were inspected twice during the year by Government Medical Officers—evidence of poor nutrition was again reported. The usual dental inspections were made—here again attention is drawn to the fact that some parents fail to have their children's dental defects remedied, while others even refuse to allow their children to undergo dental examination (see this *Bulletin* 1938 Supp p. 82*). No results of the above inspections are supplied.

In all schools European and Native lessons in hygiene are given this subject receives special attention in the Jeanes School during the course of training of prospective teachers and their wives.

Public Health Sanitation etc—Dr J. F. C. HASLAM, Director of Medical Services, again refers to the impossibility of having a review of the public health of Northern Rhodesia upon reliable statistics, for such data are not available. With the co-operation and help of

administrative officers the Department is able to maintain reasonably close touch with the life of the Protectorate and to report no unusual morbidity or mortality incidence due to disease no widespread epidemic of serious or mild communicable disease nor food shortage amounting to or even approaching famine conditions. Improving revenue permitted the addition to the establishment of two medical officers and two nursing sisters yet despite these welcome additions the preventive staff remained as exiguous as ever—with only three health inspectors for the whole Protectorate plus two employed by local authorities. Recommendations have been submitted to Government with regard to the staffing of the Medical Department in relation to the medical and public health needs of the Territory. [The *Report of the Pim Commission 1938* states that the present medical provision for the native population is entirely inadequate (p. 290).]

With regard to *anti-malarial work* it is said that the drainage work at Lusaka was consolidated and improved with beneficial results (see this *Bulletin 1938 Supp.* p. 94*). Towards the end of the year a conference was convened of representatives of various parties interested in malaria prevention in Livingstone and neighbourhood and presided over by the Director of Medical Services. Proposals endorsed by representatives of Government the Livingstone Municipal Council Rhodesia Railways and the Zambesi Saw Mills at this conference provide for joint financing of work and ensure that for the future money will be available for anti malaria work in Livingstone to be carried out under the direction of the Medical Officer of Health and a Government Health Inspector.

Throughout most of the Protectorate where there is any organized system the pail system of *sewage disposal* is adopted. The system works satisfactorily in European quarters but in native locations pail closets are said to be seldom if ever other than grossly insanitary. The Lusaka *water supply* continues to be satisfactory as to quality and quantity storage capacity is said to be inadequate.

Organized recruiting of *labour* for employment outside Northern Rhodesia again increased and the voluntary exodus of individuals from the Protectorate is said to reach a very high total. In some cases the conditions under which recruited labour was being handled were unsatisfactory and called for the intervention of the Medical Department to compel offenders to comply with official requirements. On the other hand the conditions under which labour is employed at the copper mines are described as very good satisfactory arrangements are made for the housing rationing medical facilities etc. of employees while the care of and interest in the dependants of employees is receiving increasing attention (see also under *Maternity Work* above). Improvements have been made though more are required in respect of medical care and sanitary arrangements of the thousands of labourers employed by the Zambesi Saw Mills but the conditions under which agricultural labour is employed are not altogether satisfactory.

There is much room for *housing improvement* in the larger town locations along the railway. Dr Haslam opines that a necessary preliminary step is to decide in principle (a) who is responsible for the housing of Africans within or in connexion with European townships and (b) who is to be housed in township locations. These questions are discussed at some length.

In the principal centres of European population reasonable adequate *inspection and control of food for sale* is provided, but the posting of a whole-time Medical Officer of Health in Livingstone soon showed there is still much room for improvement. *Milk supplies* are nowhere to be regarded as safe without boiling or pasteurization. The Committee appointed to study various aspects of diet and nutrition (see this *Bulletin* 1938 Supp. p. 93) has submitted a report which has since been printed.

The *creation of the statutory Native Authorities* in hygiene and sanitation is being cultivated and stimulated by District Officers with success. *courses of instruction* given to Chiefs at the Jeanes School are listened to with interest and results are seen in more cleanly and orderly villages.

Training of Health Department Personnel—The first course of Training of Medical Orderlies at the Native Medical Training School at Lusaka ended in September 1937 (see this *Bulletin* 1938 Supp., p. 93). In the light of experience gained it was decided to extend the next course to two years. There is considerable opportunity for the employment of native girls trained in nursing duties, etc. but progress in this direction is limited by the small number of girls of prescribed standards of education. *Abereshi Mission* of the London Missionary Society has for two years received financial aid from Government for training girls in medical work, but the results have so far been negligible.

Port Health Work—Arrangements remain as previously described (see this *Bulletin* 1937 Supp. p. 81) and nothing of unusual interest was recorded during the year under review. As regards *aerial traffic* the airports at Lusaka and Livingstone possess all the requirements of a "sanitary aerodrome" but Mpika (where aircraft from the north first land in Northern Rhodesia) has not even the requirements of an "authorized aerodrome." It is understood that aircraft arriving from the north are to make their first landing at Kasama airport which conforms to the requirements of an "authorized aerodrome."

Hospitals Dispensaries etc—No change is recorded in the numbers of European and Native Hospitals maintained by Government (see this *Bulletin* 1937 Supp. p. 81*) but during the year information was received that the Colonial Development Fund would contribute half the capital cost for the erection of a Native Medical Training School, Native Hospitals at Lusaka, Abercorn and Fort Jameson and 22 small Rural Hospitals and Dispensaries. Tentative provision was made in the 1938 Estimates for these additions.

Government maintained 29 *rural dispensaries* staffed by Africans, some of these dispensaries accommodate a few in-patients. Supervision of these centres remains unchanged (see this *Bulletin* 1937 Supp. p. 81) but steps are being taken to ensure increased supervision and control.

There are approximately 30 *Mission Hospitals and Dispensaries* in the Protectorate and even a larger number of mission stations where some sort of medical aid for natives is available.

The *Copper Mining Companies* continue to maintain admirable staffed and equipped hospitals for European and Native employees and their dependants.

The morbidity and mortality experience of the Protectorate in 1937 as reflected in the classified returns of Hospital in-patients can be summarized as follows —

Institution	In patients			Out patients
	Admitted	Treated	Died	
<i>Government Hospitals —</i>				
7 European	1 731	1 763	42	'
12 Native	11 344	11 922	415	41 494
28 Dispensaries	No details			
30 Mission Hospitals	No details			
4 Mining Companies	11,374	'	218	'

The steady increase in the numbers of native in patients is held to indicate increasing confidence in European medical treatment while the diminishing mortality each year among such patients suggests they are inclined to seek medical assistance more promptly than was their custom in the past.

As regards the European population it may be added that approximately 7,500 (out of a total in the Protectorate of 14 000) reside in the Copper-belt and receive medical treatment from Mine Medical Staffs and in Mine Hospitals. The Chief Medical Officer Rhokana Corporation reports that among some thousands of employees the crude mortality rate in 1937 was only 6·4 per 1 000.

The following notes summarize the observations in the Report under review concerning morbidity experience reported from twelve medical districts during 1937.

Malaria continues to be the chief cause of invaliding among Europeans and with *blackwater fever* the commonest cause of death. During the year 538 European cases of malaria were treated in hospitals (528 admissions) with one death, and 12 cases of *blackwater fever* with 7 deaths. All the malaria cases were *subtertian* infections and the vector practically always *A funestus* or *A gambiae*. Total deaths among Europeans in the Protectorate due to malaria were eight and to blackwater fever eleven.

Among *natives* the disease takes a more chronic and permanent form. 897 in-patient cases were treated with 19 deaths.

The only *filaria* infection known to occur is by *A perstans* and the embryo is frequently seen in films examined for the presence of other parasites. Dr Haslam reports positive findings in one third of 37 films examined in the Luangwa Valley.

Early in the year *bubonic plague* was reported from the Balovale District of Barotseland. the diagnosis of 9 cases and 3 deaths was confirmed. Over 40 000 rats were accounted for in the subsequent campaign. Almost simultaneously with this outbreak came reports of plague or something like it in the South of the Territory. A Medical Officer toured the area but no evidence of a fatal enzootic among rodents was found nor could any confirmation of a human case be discovered.

Of *cerebrospinal meningitis* 18 cases with 8 deaths were reported, 12 of the cases and 6 of the deaths occurring among natives. Twenty seven non fatal cases of *alacrim* and 28 cases of *influenza* with 7 deaths were recorded. all these were in natives. These figures are taken

from the returns of notified cases of infectious diseases but in another place it is stated that epidemics of influenza were reported from Balovale Broken Hill, Choma and Fort Jameson—places widely separated. At Broken Hill native adult males were specially affected, 171 cases being recorded.

Scarlet fever is uncommon in the tropics but two small epidemics occurred at Choma and Broken Hill. 21 non-fatal cases among European children were notified. Of *measles* 22 non-fatal cases among Europeans, and 121 with 4 deaths among natives were reported. There were also 12 cases of *whooping cough* among Europeans and 134 among natives and 76 non-fatal cases of *chickenpox* among Europeans and 213 cases with 18 deaths among natives.

Notified cases of *relapsing fever* were, Europeans 2. Natives 88. One European case and 50 native cases were treated at Fort Jameson. The tick *O. morsitans* is common in all parts of the country but relapsing fever due to tick-borne *S. duttoni* is not common.

Typhoid fever was responsible for 6 European and 15 Native cases with one European and two native deaths. Of *dysentery* 164 cases were notified with 8 deaths. Eleven of the cases occurred amongst Europeans, 9 being amoebic and 2 bacillary infections. All were non-fatal. The 153 cases among natives were distributed as to 44 amoebic, 12 bacillary and 97 undefined.

Thirty-four cases of *sleeping sickness* were notified with 8 deaths. Not a single clinical case of the disease was discovered during the course of a 180-mile tour across the Luangwa Valley nor was news of any case obtainable. 37 blood films were examined, all were negative for trypanosomes.

Concern is felt regarding *tuberculosis*. Cases are not reported in large numbers but are seen at medical stations sufficiently often to give rise to disquiet. Six European and 63 native cases were notified during the year and all but 5 (among natives) were of the *pulmonary* form of the disease which caused the deaths of 2 Europeans and 19 natives. *Pneumonia* continues to be a chief cause of death among natives. Among 412 cases (other than influenza pneumonia of which there were 33 cases and 10 deaths) of natives treated in hospitals 93 patients died. The case mortality appears to have been unusually high in Broken Hill, where among 50 cases 21 deaths occurred.

Chief interest regarding *helminthic diseases* is said to centre round *bilharzia*. Knowledge of its incidence and distribution are far from complete but each year it seems clearer that (a) the infection is much more common than has been realized, (b) that infection is frequently present without giving rise to symptoms of disability and (c) that present text-book descriptions give a very incomplete picture of the disease and might lead to cases being overlooked. Microscopic examinations of every native case admitted to hospital at Broken Hill and Choma showed that upwards of 20 per cent. were infected with either *S. haematobium* or *S. mansoni*; and that the majority exhibited no symptoms ordinarily associated with schistosomiasis. Similar findings were recorded in other areas. Hospital Returns show that 328 in-patient cases of schistosomiasis were treated and that 7 deaths were ascribed to this cause.

Infestation by *hookworm* is common among the native population. 454 in-patient cases were treated. Available knowledge is insufficient

to determine with accuracy to what extent hookworm infestation is of economic importance in various areas of the Territory. In the copper mines precautions are well and thoroughly applied.

Ascari infestation is common almost everywhere and in the Bangweulu swamps is believed to be nearly universal.

Veneral Diseases—Syphilis is said to be all too common everywhere and in some areas affects a very large proportion of the native population (see this *Bulletin* 1938 Supp. p. 95*). Hospital Returns supply the following figures relating to native in-patients—*Syphilis* 2 460 cases 18 deaths *gonorrhoea* 247 cases and *granuloma venereum* 3 cases. Among Europeans one case of *gonorrhoea* was reported.

The Zambesi Valley provides most of the cases of *yaws* but a new focus of infection not previously reported has been notified in Hasama Lwela's country in the Fort Rosebery district. Native in-patient cases numbered 376.

Among other diseases noted in the Report the following call for brief mention. Notified cases of *leprosy* numbered 107 all were natives. The Medical Officer Fort Rosebery has previously reported round-celled sarcoma and epithelioma in natives he now reports true carcinoma of the stomach large intestine and prostate. *Conjunctivitis* is specially referred to in reports from three districts in Mongu 336 native cases were treated and severe complications were seen. *Scabies* is widespread, 630 natives were treated as in-patients while 452 patients were treated for *tropical ulcers*. Cases of extensive burning with a history of a fall into the fire during a fit are frequently met with in native hospitals and the fit often assumed to be epileptic. It is doubted whether epilepsy is so greatly the monopoly of the people in the areas showing the largest numbers of these cases it is suggested that some may be due to cysticercus of the brain or to temporary loss of consciousness due to addiction to *dagga*.

Scientific—Routine examination work continues along lines previously described (see this *Bulletin* 1938 Supp. p. 95*) and during the year 4 424 specimens were examined.

Recommendations regarding laboratory facilities were made to Government and copies were embodied in a Memorandum prepared for the Pim Commission.

[The Report of the Pim Commission 1938 observes: The Territory is still entirely without laboratory facilities and the Director is anxious to remedy this defect. p. 293.]

Financial—Expenditure on Medical Department Services during 1937 amounted to £67 924 a sum which represents 6.9 per cent. of the total revenue or 7.5 per cent. of the total expenditure of the Protectorate during the same period.

SOUTH AFRICA

BASUTOLAND (1937)

Basutoland forms an irregular oval within the Union of South Africa, the main axis, about 150 miles long, lying in a north-easterly direction. The Orange Free State Province Natal and the Cape Province form its boundaries. It is mainly mountainous, and has an area of 11 716 sq miles, or nearly that of Belgium. The High Commissioner for South Africa is Governor of Basutoland.

Vital Statistics—The population figures resulting from the Census taken in 1936 are presented (see this *Bulletin* 1938 Supp. p. 96*) and record 1 434 Europeans 660 650 *Bantu* and 1 600 coloured persons (other than *Bantu*). Births marriages and deaths are not registered for any section of the native population.

European Officials resident numbered 135 two died but no invalidings were recorded during the year.

Public Health Sanitation etc—During the year under review Dr H. W. DYKE, Principal Medical Officer paid periodic visits to all Government Medical Stations with the exception of Makhotlong. Reference is made to the improved methods of sewage disposal introduced at Leribe and Moshale's Hoek Government Reserves (see this *Bulletin* 1938 Supp. p. 96*) a year ago. It is also explained that the construction of bore-hole latrines in Basutoland is impracticable for villages are usually sited on hills where rocks and gravel are so near the surface that augers would fail to penetrate. The villages are usually small and the dry atmosphere and strong sunlight combine to bring about the rapid disintegration of excreta the system is by no means ideal for it results in a number of fly-borne and water-borne diseases yet it is not deemed advisable to disturb existing conditions but to defer action until the people at large have developed a more sanitary outlook. The difficulties encountered when attempts are made to control the breeding of house-flies in a country like Basutoland where horses and cattle are numerous are discussed. It is said that "Baber" traps erected at the Police Stables Maseru, had the effect of reducing the incidence of flies by 75 per cent. The cost of these traps prohibit their adoption for universal use.

Previous Reports have referred to unprotected water supplies (see this *Bulletin* 1938 Supp. p. 96*). A survey of village sources of supply showed that conditions were worse than had been realized and improvements are urgently needed in the interests of public health. A scheme has been inaugurated by Government for the protection of village springs from surface pollution so far 80 springs have been dealt with and by 1939 it is expected that work on 400 springs will have been completed. The drying up of supplies in some areas may necessitate the construction of bore-holes and the pumping of water from underground sources.

The question of *native diets* is discussed at some length. It is interesting to note that stimulated by the Agricultural Department, a notable increase in the number of vegetable gardens is recorded, large numbers were entered for the competition conducted by the Department, and that the staple diet of maize is being progressively

improved by the addition of legumes and vegetables. Bulls of milk producing strain have been purchased and efforts are being made to encourage the breeding of Swiss goats of high-grade milking properties and the combined effects of these admirable undertakings should be reflected in the improved condition of the children in the country. Though the Soya bean and similar plants with a high vegetable fat content cannot be grown in Basutoland by reason of uncertain spring rainfall and autumn frosts the Agricultural Department is experimenting with a view to producing crops rich in vegetable fats suited to the normal climatic conditions of the country.

Hospitals Dispensaries etc—Medical facilities for the native population have so far been supplied almost entirely by Government. Private practice in the territory has not been sufficiently remunerative to attract either European or Native doctors with the result that for all practical purposes there is but one doctor per 50 000 inhabitants. This disproportion will shortly be relieved by the establishment of three *Medical Missions*. Dr Dyke explains that large sections of the highland population have to make long journeys over dangerous mountain tracks to obtain medical aid with the result that cases of acute illness or confinements are not able to receive adequate attention. Approach to these remote areas by aeroplane is impossible owing to the lack of suitable landing grounds properly staffed and equipped. *Medical Missions* subsidized by Government appear to be the only solution to this problem.

There are now eight Government Hospitals established in different parts of the territory with bed accommodation for 172 natives and 13 Europeans (see this *Bulletin* 1938 Supp p 96*). Additions to these hospitals provided increased bed accommodation and the hospital at Mofhotlong was completed and brought into use during the year. Various improvements have been carried out to hospitals and dispensaries.

In-patients admitted to all Hospitals numbered 3,527 and the total treated 3 644 with 225 deaths.

Of *out-patients* treated at the eight *Government Dispensaries* there were 72 264 new cases and 38,543 subsequent attendances for treatment were recorded.

The increase in the number of new cases and attendances of out-patients is ascribed to increased prosperity which enables patients to pay the small fee charged for treatment and also to the greater confidence in Government Medical Officers the native witch doctor and herbalist are gradually being superseded (see also *Scientific* below).

The training of female African nurses which commenced in 1936 (see this *Bulletin* 1938 Supp p 97*) has proved highly successful. All first year probationers passed the examination with a high standard of efficiency and have commenced their second year course of training. Six new probationers have been selected to commence the course in 1938.

In previous issues of this *Supplement* reference has been made to the fortunate freedom from certain tropical and sub-tropical diseases which characterizes usual morbidity experience in Basutoland. The notes which follow briefly summarize the references in the Report under review to the incidence of the more important communicable and general diseases in 1937.

No case of human plague was reported during the year. Poisoned wheat continues to be regularly distributed by Government to the native population, and where systematic surveys show evidence of gerbilles breeding up the Chiefs and Headmen are advised to speed up their destruction by means of the poisoned wheat (see also this Bulletin 1938, Supp. p. 87*).

The incidence of typhus fever was the lowest so far recorded with 18 cases and 3 deaths. The decline in incidence may be ascribed to a variety of factors—the disease may be losing some of its virulence. Basutos are better nourished than at the time of the disastrous epidemic of 1933-34 (see this Bulletin 1938 Supp. p. 79* and 1937 Supp. p. 86*) and widespread immunity has been acquired by survivors. Still further it may be noted that the special methods adopted in 1935 for dealing promptly with any outbreak have proved conspicuously successful for example an outbreak occurred at a remote mountain village with 5 cases, but energetic action prevented the occurrence of further cases. Dr Dyke describes in detail the system of de-vermining carried out (see this Bulletin 1937 Supp. p. 86* and 1938 Supp. p. 87*).

It is said that 255 cases of typhoid and paratyphoid fever were reported during the year but according to classified returns there were 98 in-patient cases with 15 deaths and 237 cases among out patients. Among in-patients 82 of the cases were Bact. typhosum infections, on Bact. paratyphosum A and in 13 cases the type of infection was not defined among out-patients 225 were typhoid and 12 unclassified. In many cases the source of infection is said to be traceable to polluted water supplies. The improvements now being carried out (see Public Health above) should result in reducing the incidence of the disease. Dysentery is not mentioned in the text of the Report but 39 in-patient cases (5 deaths) and 216 out-patient cases are recorded. Among in-patients 2 were amoebic and 12 bacillary infections but in the remaining 24 cases the type of infection was not determined. The out-patient cases comprised 149 undefined as to type, 28 bacillary and 39 amoebic infections. Under the title diarrhoea and enteritis appear 1 432 cases under 2 years and 1 429 at ages two years and over.

Tuberculosis.—In-patients treated for the disease totalled 107 (18 deaths) and of these 40 were cases of the pulmonary type of the disease with 11 deaths at the dispensaries where 832 cases were dealt with 443 were of the pulmonary type. It is said that pulmonary tuberculosis has very appreciably diminished since 1935. The effects of prosperity and of good food supplies on diminishing the incidence of prosperity are commented upon (from 1935 crops were good and money earned by labourers plentiful) and it is opined that good economic conditions plus the efforts being made to improve dietaries (see above Public Health) should bring about further improvement in the incidence of the disease among the Basuto. Other respiratory diseases mentioned in the Report include 5 323 cases of bronchitis and 185 cases of pneumonia of the latter 120 cases received treatment as in patients and 24 died.

Unbalanced diets have been the subject of brief mention in the section Public Health above. It remains to say that the effects are reflected in the occurrence of 120 cases of scurvy and 270 cases of pellagra while

the 4,432 cases of *dyspepsia* and 6,221 cases of *constipation* recorded are largely attributed to imperfectly balanced diets.

We have already referred to the fact that in previous Reports reference has been made to the freedom from certain tropical and sub-tropical diseases characterizing morbidity experiences in Basutoland, and attention has been called to the comparative absence of *helminthic diseases*. The classified returns show only 212 cases of *diseases due to internal parasites* among them being 100 cases of *tuberculosis*.

Leprosy—In an Appendix to the Report under review the Superintendent of the Leper Settlement describes the year's work in detail while in another Appendix Dr R. C. GERMOND Medical Officer of the Leper Settlement reports the results of a survey of a portion of the Mafeteng District. To the Leper Settlement 104 new cases were admitted during the year 27 recurrences and 27 re-admitted deserters. There were 59 deaths 71 patients were discharged 41 deserted and at the end of the year there remained 669 patients under treatment. The Report discusses the work under such headings as (a) origin of new cases admitted (b) duration of disease before admission (c) age distribution (d) treatment etc.

The results of Dr Germond's survey are encouraging and tend to show that the incidence of the disease is lower in the Lowlands area than in the surveyed part of the Eastern Highlands for out of a population of 15,000 persons only 7 cases were discovered, and of these one was spontaneously arrested and in two the diagnosis was not confirmed (see also this *Bulletin* 1938 Supp. p. 98*).

Venereal diseases—The following data have been extracted from Hospital and Dispensary Returns and indicate the numbers of cases treated during the year—

Item	In patients	Out-patients
Syphilis	11	9,630
Gonorrhoea	10	1,651
Granuloma venereum	—	5
Soft chancre	—	31

It is observed that though the increase in the numbers of cases dealt with may be attributed in part to the increased confidence of the natives in modern medicine greater incidence of primary and secondary stage cases indicates the occurrence of an undue number of new infections. Dr Dyke explains that economic conditions and food supplies are closely correlated with syphilis incidence. When conditions are good an abundance of kaffir beer is brewed by infected native women at points of entry to the territory used by natives returning from the Mines. These men spend their earnings at these places become infected, and carry this infection to their native villages and infect their own women-folk. The latter do not seek treatment until the secondary stage has well developed meanwhile they may be infecting their own or neighbouring children through the handling of household utensils. At the Leribe and Mophale's Hoek dispensaries enquiries were made of 1,500 consecutive out patients as to whether or not they had had or still had syphilis. At Leribe 55 per cent. and Mophale's Hoek 31 per cent. admitted infection.

Among other diseases recorded in the Report appear 1,580 cases of influenza 1,332 of whooping cough 3,541 of rheumatism 1,791 of diseases of the skin

Scientific—In the absence of a Laboratory Report two special reports included as Appendices to the Annual Report under review call for mention. The first of these contributed by Dr. R. Germond describing a special leprosy survey and the results obtained, has been referred to in the section *Leprosy* above. The second, furnished by Dr. A. E. Young Medical Officer Maseru, deals with the surgical treatment of urinary fistula among Basuto women a condition commonly met with and usually the result of unskilled native assistance in childbirth. During the two years 1836-1837 eighteen cases were treated by implantation, and 16 were discharged as cured. Operative methods anaesthesia and end results are described. In the words of the Principal Medical Officer "The success achieved in this operation on Basuto women by the Medical Officers at Maseru and Leribe will compare favourably with that obtained by surgeons of high repute in the medical world."

Financial—Total expenditure on Medical Department services during 1837 amounted to £47,540 the Lepet Settlement accounting for £17,926 of this sum

BECHUANALAND PROTECTORATE (1837)

Bechuanaland is bounded on the south and east by the Union of South Africa, on the north by Southern Rhodesia, and on the west by South-West Africa. It has an area of about 275,000 sq miles. The High Commissioner for South Africa supervises the affairs of the Protectorate

The Annual Medical Report for the year 1837 had not been received at the time of going to press on October 16th 1839

SWAZILAND (1837)

The Swaziland Protectorate is situated in British South Africa, between the Drakensburg and Lebombo Mountains and is bounded on the north, west and south by the Transvaal, and on the east by Portuguese East Africa and Zululand. Its total area is 6,705 sq miles.

Total Statistics—A census taken in 1838 returned the general Native population as 153,770 other population figures supplied are European population 2,740 and Coloured population 705 making a grand total of 157,215

Registration is not compulsory and no birth, death, or infant mortality data are available

European Officials resident number 106 with an average number resident of 101. No deaths were recorded but one Officer was invalided during the year. Resident Native Officials numbered 162 with an average number resident of 158. No invalidings or deaths were recorded. The health of both European and Native Officials was good throughout the year

Maternity and Child Welfare Work—The Raleigh Fitkin Memorial Hospital remains the only institution in the territory where a special department under the charge of a British Red Cross Society Nurse deals with this important branch of public health work. The volume of work dealt with included Nursing Mothers examined 1 807 deliveries 180 ante natal examinations 2 212. At all hospitals in the Protectorate 245 cases of normal labour were dealt with.

Ante natal work is carried out and Child Welfare Clinics are conducted at all Government hospitals and Medical Outposts as part of the ordinary routine of work, though no details are supplied it is reported that attendances are increasing.

School Hygiene—The health of European children in the highlands of the country was good but many of those resident in the bush veldt suffered from malaria during the autumn. The prevalence of dental caries is again a subject of comment. There is no resident dentist in the territory. It is intended that nurses in charge of Medical Outposts shall give elementary instruction in hygiene in the schools in their areas whenever possible.

Public Health Sanitation etc—Dr D DREW the newly appointed Principal Medical Officer submits the Annual Report for 1937 though he was not serving in any part of the Protectorate during the year under review. Beyond the fact that during the autumn a severe epidemic of malaria occurred it is said the general health of the territory was satisfactory during the year under review. In the absence of further information it is presumed that methods of *scavage and refuse disposal* remain unchanged (see this *Bulletin* 1937 Supp p 93* and 1938 Supp p 104*). With the exception of Bremersdorp *water supplies* of all townships are described as unsatisfactory. Proposals are under consideration for the improvement of supplies in Mbabane Goedgedun and Stega.

The largest number of *native labourers* is employed by an Asbestos Mining Company. A Government Medical Officer has visited the mine regularly and attended to the needs of employees but the Mining Company will shortly employ a whole-time Medical Officer of their own. The health of natives employed in the alluvial tin mines continues to be satisfactory.

Training of Sanitary Personnel—Under this heading it is reported that the appointment of a Sanitary Inspector has been authorized. This Officer will undertake the training of native sanitary inspectors who will be posted to suitable centres throughout the Protectorate. It is said that the sanitary arrangements in the eight townships leave much to be desired. The work of the Town Inspectors is fully appreciated but untrained men cannot be expected to raise the sanitary services of communities to a satisfactory level.

Recommendations for future work emphasize the urgent need of providing adequate and satisfactory water supplies at Mbabane Hlatikulu and Goedgedun (see also this *Bulletin* 1938 Supp p 104*).

Hospitals Dispensaries etc—The increase in the numbers of patients treated at hospitals continues. The additional accommodation urgently needed at the Raleigh Fitkin Memorial Hospital will be met by extensions to existing buildings made possible by generous public subscriptions to commemorate the Silver Jubilee of King George V. To meet the inadequate accommodation at the Mbabane Hospital,

proposals are being submitted which should cope with probable requirements for the next few years. The extensions to the Hlatikulu hospital have more than justified themselves for even the additional accommodation provided was frequently overcrowded during 1937.

There are two *Government dispensaries* and a third is in course of construction, and there are also three *Mission dispensaries*. Another *Medical Outpost* was opened during the year bringing the total to six. At all these centres valuable work is being carried out.

At all hospitals in the Protectorate 3,278 in-patients were treated and 115 deaths were recorded. 1,571 in-patients were treated at the Raleigh Fitkin Memorial Hospital. The following figures relate to out patients treated at various centres during the year under review —

Tw. Government Hospitals	19,943
Two Government Dispensaries	7,530
Six Government Medical Outposts	6,584
Raleigh Fitkin (Mission) Hospital	16,577
Three Mission Dispensaries	12,843

The training of native nurses progresses satisfactorily at the Raleigh Fitkin Memorial Hospital. 4 nurses are in the first year of their training, 2 in the second, 2 in the third, and 4 are completing the final year of the course.

There is no institution in the Protectorate for the housing of *mental patients*, many of whom have to be accommodated in the gaols, and the more violent sent to institutions of the Union of South Africa. It is suggested that a central institution might be provided for the use of the three High Commissions Territories.

In the autumn of 1937 one of the worst epidemics of *malaria* was experienced. The disease was severe in type and contrary to usual experience in Swaziland, a number of cases of cerebral malaria were treated. No figures of case incidence are given for it is said the large majority of patients obtained quinine from the various quinine depots and treated themselves, and no record of numbers of people applying for quinine appears to have been maintained. In patients treated for the disease totalled 712 and 19 deaths were recorded. types of infection were *benign tertian* 686 *subtertian* 23 and *blackwater fever* 3 cases.

Although these infections are unmentioned in the text of the Report, Hospital Returns appear to show 11 cases of *smallpox*, 10 of *scarlet fever*, 22 of *whooping cough* and 74 of *influenza*. [We say "appear to show" for from the original typescript it is difficult to distinguish the precise position of some of the figures. It is noted also that the nomenclature used is that of the International List 1921 Revision: it is suggested that the special nomenclature for British Colonies might be adopted.]

Eighteen cases of *enteric fever* were treated in hospitals with 6 deaths. In the Southern District where cases are usually reported, prophylactic inoculation was carried out with the result that no case occurred in the area.

Fifty-nine patients were treated in hospitals for *dysentery* and 4 died. the types of infection were *amoebic* 48 *bacillary* 11. Amoebic infections are said to be relatively common in certain parts of the middle and low veldt, and many cases of chronic *diarrhoea* (54 in-patients treated) are said to be amoebic in origin.

All Medical Officers are said to be of the opinion that *tuberculosis* is increasing the most common manifestation being the *pulmonary* form of the disease. Of the 83 cases (all forms) treated in hospitals with 10 deaths 52 of the cases and 9 of the deaths were due to *pulmonary tuberculosis*. The problem is serious and not easily solved for in a country of meagre financial resources institutional treatment is scarcely feasible apart from the fact that difficulty would be experienced in persuading patients to remain in an institution long enough to effect complete cure. Efforts are being made to build up the resistance of natives to the infection by the improvement of local diets. Other *respiratory ailments* treated in hospitals included 61 cases of *pneumonia* with 10 deaths, and 45 non fatal cases of *bronchitis*.

The prevalence of *schistosomiasis* is again a subject of comment (see this *Bulletin* 1938 Supp p 106*) and it is said that bilharzia infections are probably responsible for more chronic ill health than is usually realized. Hospital Returns show that 30 in patients were treated for *taeniasis* and 62 for *schistosomiasis*.

Leprosy does not appear to be increasing only one case was reported during the year. Proposals have been submitted for the transfer of the present leper settlement to a more suitable site.

Veneral Diseases—Judging by admissions to hospitals and treatments at V D Clinics and Medical Outposts it is said *syphilis* appears to be increasing. The only figures presented are those for hospital in-patients 368 cases being recorded. As regards *gonorrhoea* the disease is said to be much more common than the 34 hospital cases indicate and it is probable that a large number of the women attending various centres for gynaecological conditions have been infected with the disease. Natives do not regard gonorrhoea as a serious ailment nor do they associate sterility and other diseases of women with this condition.

Financial—Total expenditure on Medical and Sanitary Services during 1937 amounted to £18 837 a sum which represents 15·7 per cent of the total revenue of the Protectorate during the same year.

SAINT HELENA (1937)

The Colony of St. Helena consists of the Island of St. Helena (47 sq miles in area) and its dependency the Island of Ascension (34 sq miles in area). St. Helena lies in the South Atlantic in lat. 15°55 S and long 50 42W and is about 4 210 miles from Plymouth and 1 700 miles from Cape Town. Ascension lies about 700 miles north west of St. Helena.

Vital Statistics—The estimated population for the year under review was 4 515 [in another section given as 4 415]. *Registered live births* numbered 132 and deaths 32, the resulting crude birth and death rates being 29·2 and 7·1 per 1 000 respectively. *Infant deaths* numbered 6 so the infant mortality rate was 45·4 per 1 000 live births. During the year 8 *stillbirths* were recorded.

The numbers of *European Officials* are not stated, but no deaths were recorded in this group though one official was invalided on grounds of *cancer* of the floor of the mouth.

Maternity and Child Welfare Work—With a view to raising the standards of maternity services in the Island a scheme was inaugurated in February for the training of selected women at the Civil Hospital over a period of six months to be followed by six months practical work with the best midwife on the Island. Two selected women completed their hospital training and following examination by the Senior Medical Officer are now engaged on the second six months of the course while two other women have commenced their training at the Hospital.

Up to the present no Child Welfare Work has been undertaken but the Secretary of State has approved a vote for this purpose and a clinic will be established at the Civil Hospital.

School Hygiene is not mentioned.

Public Health Sanitation etc—With the exception of an outbreak of influenza in the middle of the year the general health of the population was good throughout 1937.

Dr J GRAY Senior Medical Officer calls attention to economic conditions in the Island practically the only article of export is flax fibre and the development of that industry cannot keep pace with the needs of a steadily increasing population. The result is reflected in extreme poverty and what are described as appalling housing conditions. Much of Jamestown the capital is slum property and it is added some of this slum property belongs to Government. Instead of giving a lead by upkeeping the property the houses have in some instances fallen into wrack and ruin. In country districts conditions are equally objectionable with families living in a single room many houses in town and country should be condemned as unfit for human habitation, yet no other accommodation is available (see this *Bulletin* 1938, Supp p 108*). Once again Dr Gray emphasizes that Medical Officers should be gazetted Health Officers an up-to-date Health Ordinance should be introduced and trained Health Visitors should be appointed.

No reference is made to methods of *sewage disposal water supplies* etc. and in the absence of information it is presumed services remain as described in this *Bulletin* 1937 Supp p. 97*.

Port Health Work—No change in the system of services is recorded (see this *Bulletin* 1937 Supp p 97*). During the year 41 ships called at the Island.

Hospitals Dispensaries etc—Services and facilities remain as previously described (see this *Bulletin* 1937 Supp., p 98*). During the year 291 in-patient cases were dealt with and 13 Hospital deaths recorded. *Out-patient* attendances at the Civil Hospital numbered 5 083 and at the Hutts Gate and Sandy Bay Dispensaries 1 030 and 288 respectively. Medical Officers continue to hold outdoor dispensaries at their homes each morning and attendances at these totalled 1,907 while visits to patients in their own homes numbered 1 108.

The condition of the *Prison* and health of the inmates are said to have been satisfactory. Dr Gray's condemnation of the *Lunatic Asylum* is repeated (see this *Bulletin* 1938, Supp p 108*).

During the month of June an outbreak of *influenza* occurred. Hospital in-patients treated for the disease numbered 32 many of the cases were complicated by lobar pneumonia, but none terminated

fatally. Only one fatal case of *tuberculosis* (non respiratory) was recorded. Among the respiratory diseases, 14 patients were treated for *acute bronchitis* and 3 for *broncho-pneumonia* of *lobar pneumonia* there were 6 cases and one death.

Three non fatal cases of *amoebic dysentery* were recorded. (With regard to previous experience the reader is referred to this *Bulletin* 1937 Supp. p 98* and 1938 Supp. p 108*.)

The incidence of *beriberi* is said to be declining. 7 non fatal cases were dealt with during the year. *Diseases of the digestive system* were responsible for 21 hospital cases with one death.

Special attention is directed to the high incidence of *malignant disease* in the Island. During the year 5 in-patients received treatment and one died while an additional 4 deaths due to cancer occurred in the homes of patients and two cases left the Island. During the past 26 years 76 deaths have been ascribed to cancer.

There is one case of *leprosy* on the Island. the patient is segregated and treated with iodized moogrol but no improvement in condition can be recorded.

No case of *syphilis* was seen but 9 persons were under treatment for *gonorrhoea* and several for stricture of the urethra due to the same cause.

Financial—Expenditure on Medical and Sanitary services during 1937 amounted to £3 213 a sum which represents 7.7 per cent. of the total revenue of the Colony during the same year.

NORTH AFRICA

SUDAN (1937)

The Sudan is bounded on the north by Egypt, east by the Red Sea, Eritrea and Abyssinia, south by the Uganda Protectorate and Belgian Congo west by French Equatorial Africa. Its western and northern frontiers meet in the Libyan desert. The greatest length north to south is approximately 1,300 miles and from east to west 1,200 miles. Its total area is about 1 008 100 sq. miles.

Total Statistics—Estimated population figures are given for 8 of the 9 Provinces but complete vital statistical data are available for Khartoum Province only. As regards the Provincial population according to the 1937 estimates the populations of four Provinces have decreased in numbers, three have increased and in one the figure is unchanged, by comparison with 1936 data these changes are indicated in the Table below by the signs (+) (—) and (†) respectively [Why the population figure for the White Nile Province is omitted is not stated.]

Province	Estimated Population	Province	Estimated Population
Khartoum	255 166 (—)	Darfur	715,843 (—)
Northern	571,330 (+)	Upper Nile	502,163 (—)
Blue Nile	760 224 (—)	Equatoria	1 129 000 (+)
Kassala	419,857 (+)	White Nile	Not given.
Kordofan	1,222,729 (†)		

These figures lacking the population of the White Nile Province, give a total of 5,576 012 persons.

The data for Khartoum Province are *population* 255 166 *registered live births* 4,274 *registered deaths* 2,454 *and infant deaths* 345. The crude birth and death rates were 16.8 and 9.7 per 1 000 respectively and the infant mortality rate 80.7 per 1 000 live births. For Khartoum Province births are classified by sex and nationality and deaths by sex. Rural vital statistical facts presented in the 1936 Report are absent from the Report under review (see this Bulletin 1936 Supp. p. 106*).

Government Officials of British nationality numbered 849 one was invalided, and one died. Other Government Officials included 4,243 *Sudanese* 539 *Egyptians* and 45 *Syrians*. Eleven Sudanese were invalided and 8 died 8 Egyptians were invalided but no invalidings or deaths were recorded amongst Syrian officials.

The average strength of the *Sudan Defence Force* was 4 444. During the course of the year 3,638 N.C.O.s and men were admitted to hospitals cases included 748 for *malaria* 117 for *unspecified fevers* 592 for *venereal diseases* and 822 for *wounds and other injuries*.

Maternity and Child Welfare Work—Ante-natal clinics have been established in most towns in the Northern Sudan to supplement the work already carried out at the local Hospitals. At the Omdurman Clinics 1,592 of the 4,229 attendances recorded were new cases. The returns of the Civil and C.M.S. Hospitals in Omdurman, the Midwifery Training School and the trained midwives show that 1 482 confinements

were dealt with and 15 maternal deaths (during a period of eight months only). It is said that approximately 80 per cent of pregnant women in Omdurman attended the ante-natal clinics during the year under review. In Khartoum and North Khartoum District there are 5 clinics and at these centres 4710 attendances were recorded of which 1341 were new cases. The clinics at the four centres in the Northern Province were well attended in these areas there are 28 trained and 119 licensed midwives. New clinics were opened at Kassala (Kassala Province) and Juba (Equatoria Province) and are functioning successfully.

At the *School of Midwifery, Omdurman* 35 pupil midwives completed the course of training and all passed the qualifying examination two midwives attended a revision course. Trained midwives in rural areas are making satisfactory progress. Arrangements have been made to open a subsidiary school at Juba where midwives will be trained for service in the Northern Sudan.

School Hygiene—The School Medical Service has been extended in most Provinces of the Northern Sudan. During the year 332 schools were visited and 2644 pupils were medically examined. The results of these examinations are classified for Districts and Provinces and the percentage findings noted for disease conditions seen. In the Northern Sudan *trachoma* is responsible for the majority of cases referred for treatment while in the South a high percentage of school children suffer from chronic *malaria* and *ankylostomiasis* (see this *Bulletin* 1938 Supp. pp 110*-116*). About 10 per cent of the children in the Northern Sudan have carious teeth and in Equatoria Province the incidence of skin disease suggests a lack of attention to the cleanliness of bodies and clothes. In some areas slight but definite signs of improvement in physique are noted.

In Khartoum Province 33 schools were inspected and 5601 children were medically examined. Only one Girls' school was visited.

Public Health Sanitation etc—The Report under review contains an admirable *Historical Survey of the Development of the Sudan Medical Service* from the conquest and re-occupation of the country in 1899 to the present day.

Throughout 1937 the public health of the Sudan was satisfactory. Beneficial rains gave the country its sixth successive year of good harvests the population enjoyed a state of reasonable prosperity and there was an absence of any serious epidemic outbreak. Sanitary services have been extended and consolidated in many areas and *latrine* accommodation increased and improved in most Provinces. Improvement in village sanitation recorded. In the Northern Sudan it is said a notable improvement in the cleanliness of towns and villages is observable. This has resulted through the efforts of an increase in supervisory staff and the willing co-operation of the native administration. Local committees for the improvement of health have been established in the principal district headquarters and provincial boards unify sanitary control and expenditure. Preventive medicine continues to develop and an adequate supervisory sanitary staff is being trained as rapidly as possible to meet the needs of the whole country.

Purification plants and piped water supplies are installed at Khartoum Khartoum North Omdurman Atbara Port Sudan

Wad Medani Abu Usher and Juba. The Egyptian Irrigation Colonies at Malakal, Gebel Aulia and Gordon's Tree Dockyard are similarly provided for constructional works in connexion with supplies to Wadi Halfa are in progress, and schemes and plans applicable to Torit and Malakal Town are in course of preparation. Routine examination of established supplies continued to give satisfactory results. A central committee established in Khartoum has studied the problem of native housing with a view to discovering types suited to local needs and which will satisfy public health and economic requirements. Plans of various types have been prepared and circulated for criticism by British and Native Officials. Models are in course of preparation and demonstration houses are to be erected at various centres. A programme of slum clearance designed to spread over three years has been initiated in Halfa. Steady progress in similar areas elsewhere in the Northern Sudan is reported. In Juba a marked fall in the incidence of malaria amongst northern officials is directly attributed to improved housing.

Two additional *Sudanese Sanitary Officers* qualified during the year and were posted to provinces. A sanitary officer is now at work in all provinces where British staff is not available (see this *Bulletin* 1938 Supp. p. 111). *Sanitary Overseers* are junior qualified Sudanese Officials, who in the larger towns work under the supervision of British Sanitary Inspectors or Sudanese Sanitary Officers. Elsewhere they function independently. In 1935 arrangements were made for suitable candidates to undergo a course of instruction in Khartoum and to pass a qualifying examination. It was estimated that 70 appointments would be necessary to meet the immediate public health needs of the country. 51 of these posts have been filled and with few exceptions appointees have proved an unqualified success. To meet the needs of the Southern Sudan it is essential that personnel shall be recruited and trained locally. A training class for this purpose has been organized at Juba. Successful candidates at the end of the course of training will be posted to districts from which they were recruited.

Port Health Work Quarantine etc.—During the year 1,174 ships entered Port Sudan. No ships were quarantined nor was any person isolated from ships. Quarantine measures were enforced against arrivals from Bombay on account of smallpox, and against arrivals from Bangkok on account of cholera. Quarantine work at Port Sudan is dealt with by a Medical Officer working under the supervision of the Senior Medical Inspector while Port Sanitation is in charge of a British Sanitary Inspector holding special qualifications for this branch of work. During the pilgrim season a Medical Inspector and a Medical Officer are posted to Suakin (where also an Assistant Medical Officer is in permanent residence) for all Sudanese and West African pilgrims for the Hedjaz in transit through the Sudan must leave and return via the Suakin Quarantine Station. During the year 1,728 Sudanese and 4,618 West African pilgrims passed through the Station, all were vaccinated and inoculated against cholera. The general health of the 4,929 pilgrims returning from the Hedjaz via Suakin was good. 85 were admitted to hospital and 5 died. At the Wadi Halfa Quarantine Station 1,667 Egyptian labourers were dealt with, one was rejected as unfit and 89 were found to be infected with *shikaris* and received treatment.

The sanitary control of aircraft continued along lines previously described (see this *Bulletin* 1938 Supp p 112*) During the year the 873 insects collected from commercial aircraft arriving included 824 Diptera of which only 7 were mosquitoes

Hospitals Dispensaries etc—Medical work carried out in hospitals and dispensaries continues to increase it is believed that the figures for in and out patient treatments will remain established at about the present record (see below) and it is not intended to increase facilities for treatment in the near future (see this *Bulletin* 1938 Supp p 112*) but extensions have been planned to meet special exigencies It should be added that the great majority of the hospitals in the Sudan now have clinical laboratories staffed by trained Sudanese laboratory assistants

At Omdurman the new Out patient Department for men and an additional wing of 50 beds were opened during the year Additional ward accommodation has also been provided at Port Sudan and a new out patient department and a ward for women were opened at Juba. Overcrowding in the wards at the Malakal Hospital was reported at the beginning of the year and an increase in the volume of work at the Abu Usher Hospital. Two of the Khartoum Hospitals need to be replaced According to the classified returns there are now 38 Hospitals and 346 Dispensaries in various parts of the country with an aggregate accommodation of 5 494 beds.

Of the eight *Medical Mission Institutions* 4 are maintained by the Church Missionary Society 3 by the Sudan United Mission and one by the American Mission.

The volume of work dealt with at all treatment centres reads as follows —

Item	In-patients						Out patient Attendances
	Europeans	Deaths	Non Europeans	Deaths	Total Cases	Total Deaths	
38 Government Hospitals and 346 Dispensaries							
C.M.S. Hospitals	405	7					
Sudan United Mission Hospitals	?	?	100 683	2,167	101 083	2,174	6 675 889
American Mission Hospital	?	?	?	?	2,167	?	196,303
	?	?	?	?	556	?	15 494
					20	?	10 178

Special attention is being paid to the better *training of staff* the training of Assistant Medical Officers Sanitary Overseers Nurses and Midwives and other personnel continued throughout the year During 1937 no new students were admitted to the *Kitchener School of Medicine* where the 18 students under training comprised 16 medical and 2 sanitary students Eight students sat for examination in Public Health and Pathology eight were examined in physiology and two sat for the Diploma examination of the Royal Sanitary Institute with the exception of one candidate in the Public Health and Pathology examination all were successful.

The Sudan with its thousands of miles of land frontier and its constant and varied traffic by many and devious routes which combine to render efficient quarantine control impracticable is specially vulnerable to the introduction of epidemic diseases from neighbouring countries. The year 1926 saw the introduction of *relapsing fever* from the West, and for four years the disease ravaged the population of Darfur between 1928 and 1930 thousands of cases of *smallpox* owed their origin to infection introduced by French immigrants. These two diseases again made their appearance towards the end of 1937 through the agency of infected labourers returning from Eritrea and Abyssinia. Of *smallpox* 425 cases with 57 deaths were reported, 231 of the cases and 41 of the deaths occurring in the Blue Nile Province and 103 cases with 10 deaths in Kordofan Province. West Africans from Abyssinia and Eritrea carried the disease to Kassala Province where 50 cases and 6 deaths were recorded. An extensive vaccination campaign was organized in each of the infected areas. 561 198 vaccinations were performed, 311 881 of these in the Blue Nile Province alone.

In the words of the Report, "West African immigrants with *relapsing fever* provided a constant stream of infection to Kassala and Blue Nile Provinces throughout the year." Altogether 374 cases and 48 deaths were reported of these, 191 cases with 12 deaths occurred in the Blue Nile Province 65 cases and 10 deaths in Kassala Province and 68 cases with 24 deaths in Darfur Province. Delousing stations were established at various centres and 25,381 persons were dealt with during the year.

Cases of *cerebrospinal meningitis* were reported from every Province, though the country was spared the devastating epidemics which ravaged the Western Provinces during the period 1834-1836. With the exception of an isolated outbreak in the Awel District of Equatoria Province the disease remained sporadic and showed no signs of assuming epidemic proportions. Altogether 446 cases and 293 deaths were reported (see this *Bulletin* 1938 Supp. p. 113*).

Plague and *typhus* have not so far been reported in the Sudan and no case of *cholera* has occurred for many years. Strict anti-plague measures are enforced at Port Sudan and elsewhere rat-infestation is kept within reasonable limits.

The incidence of *malaria* which was high in the Northern Sudan at the end of 1936 (see this *Bulletin* 1938 Supp. p. 112*) fell in January 1937 and remained below the average for the remainder of the year. The anti-malarial staff in this area has been considerably strengthened in recent years. In the Gezira and adjacent areas of the Blue Nile Province the investigations of the malarialogist are yielding results of practical application. In every part of the Sudan efforts are being made to popularize the use of a cheap and efficient insecticide and nets among the general population. The classified results of medical examinations of school-children show that the splenic index figures range from 0.4 per cent. to 54.8 per cent.

Hospital Returns show that 144 694 cases of malaria were treated during the year of these 7,883 were in-patients and 39 died. At the Stack Medical Research Laboratories where 1 691 blood films were examined 189 were *subtertian* infections, 58 *benign tertian* and 6 *quartan*. The Government Entomologist, Mr H. W. BENDROD

describes work concerned with the survey of mosquitoes in Khartoum and Urban District and in greater detail the continuance of the mosquito research in the Gezira (see this *Bulletin* 1938 Supp p 118*)

Of *blackwater fever* 20 cases with 5 deaths were notified.

Enteric fever was responsible for 165 cases and 17 deaths two of the cases and two of the deaths occurring amongst Europeans of the total cases recorded 78 were notified in Khartoum Province, 49 in Omdurman alone. At the Stack Research Laboratories where Widal tests were applied to 850 samples of serum, 145 reacted positively with *Bact typhosum* while among 480 blood cultures 72 gave positive findings with *Bact typhosum* infections 5 *Bact paratyphosum A* and 1 *Bact paratyphosum B*

There were 2 642 admissions to Hospitals on account of *dysentery* and of these 2,504 were *amoebic* and 139 *bacillary* infections. Seventeen of the cases occurred among Europeans and all the 53 deaths recorded occurred among non Europeans. Examination of 1,298 faecal specimens at the Stack Laboratories showed the Flexner Y bacillus in 35 cases Shiga's bacillus in 5 that of Schmitz in 3 amoebae in 13 and ova in 57

The incidence of *kala azar* appears to be increasing it is difficult to determine to what extent the increase is due to the development of medical work in areas where special attention has been devoted to the disease in recent years. Altogether 333 cases were reported (all non Europeans) with 57 deaths. In the Blue Nile Province there were 148 cases as compared with 111 in 1936 and in Gedaref (Equatoria Province) 50 cases as against 13 in the preceding year

It is said the incidence of *tuberculosis* shows no increase despite increasing risk of infection from outside the Sudan this is attributed to the general raising of the standard of living which has increased the resistance to the disease of the population as a whole. Altogether 883 cases were admitted to Hospitals and 188 died 488 of the cases and 148 of the deaths were ascribed to the pulmonary form of the disease Two non fatal cases of pulmonary tuberculosis occurred among British patients who are said to have contracted the disease in Egypt

Dr A R McHELVIE the Ophthalmic Surgeon contributes the usual *Ophthalmic Report* in which he sets out in great detail the record of the year's work. At the River Hospital where 88 beds are provided for ophthalmic cases 653 in-patients were treated new cases among out patients numbered 7 640 and 35,938 attendances were recorded at the Omdurman Hospital there were 97 in patients, 3 777 new cases among out patients and 90 180 attendances recorded. Among the 653 in patients at the River Hospital 78 were treated for *trachoma* and among the 7 640 new out patients 2 018 were treated for this condition in all Hospitals in the Sudan no less than 262,574 in-patient and out patient cases of *trachoma* were treated during the year under review

Sleeping sickness remains endemic in the Zande District of Equatoria Province (see this *Bulletin* 1938 Supp p 115*) Of the 89 cases recorded 63 were reported from the Zande District—where for some years the most rigorous and irksome restrictions have been imposed yet re-infections continue from outside the Sudan—and 23 from the Kajo-kaji sub-district. The disturbing increase in incidence in the

latter area (where in 1936 only 8 cases were reported) suggests that the local fly is infected in spite of the Pass System (see this *Bulletin* 1938 Supp., p. 115*) illicit movement still takes place across the border into the heavily infected Aringa area of Uganda. A thorough inspection of the whole district is in progress. It has been decided to relax certain measures which are definitely irksome to the inhabitants and to concentrate on intensifying such precautionary measures as the distribution of population in selected areas, clearing of streams, tsetse fly destruction, etc. To this end an Assistant District Commissioner has been appointed to deal with the administrative work in connexion with sleeping sickness prevention, and the cadre of public health officials has been increased.

Helminthic diseases—Hospital and Dispensary Returns supply the following data relating to patients treated for three specific infections, etc. —

	Schistosomiasis	Amoebiasis	Dracontiasis
In patients only	1,974 (8 deaths)	220 (11 deaths)	731 (1 death)
In-patients and out-patients	11,974	3,041	2,969

Schistosomiasis (*S. haematobium*) is said now to be of little public health importance in the Sudan though it is only by constant efforts in certain areas, notably the Gezira, that incidence is kept at a low level and repeated infections are prevented. Special attention is now being devoted to Wadi Halfa (Northern Province) and the Duedin and Korti districts (White Nile Province) where annual examinations of the people, regular treatment, the re-siting of villages and the provision of clean water supplies and sanitary latrines are among works to be undertaken in an effort to diminish incidence and intensity of the infection. Of the 11,974 cases dealt with during the year it is noted that 3,875 were recorded in the Northern Province, 2,630 in Kordofan Province and 2,360 in the Blue Nile Province. The following additional facts are supplied for specific areas —

	Number examined	Number infected	Percentage
Northern Province			
Dongola and Marowe	45,741	1,133	2.5
Wadi Halfa	18,490	2,002	10.8
Blue Nile Province			
Gezira Adults	30,768	28	0.08
Children	10,039	63	0.62
Total	40,806	86	0.22

It is said that *S. mansoni* infections of a mild and in some cases apparently symptomless type are commonly encountered in the Equatoria Province (Southern Sudan) but that it has been difficult to find any possible snail hosts. An investigation carried out in the Province showed that *Physopsis diuersi* was readily found, often in large numbers and it is believed that this snail must be the chief if

not the only vector of *S. mansonii* infections in the Equatoria Province even though up to date no specimen infected with *S. mansonii* has been found.

Ancylostomiasis is a disease of no public health importance in the Northern Sudan but is a serious problem in the South especially in certain districts in Equatoria Province. Of the 3 044 cases reported during the year 2 277 occurred in the Equatoria Province (see also this *Bulletin* 1938 Supp. p. 116*). The usual measures are being taken to reduce the incidence of the disease. *Dracontiasis* continues to be prevalent in the Southern Sudan and the Nuba Mountains. In Equatoria Province 2 744 cases were treated during the year progress is reported in the construction of wells in the Juba and Yei Districts of this Province (see this *Bulletin* 1938 Supp. p. 116*).

Of *leprosy* the Report observes. There is no evidence of any increase in the incidence. During the year seven new leper settlements were opened in the Nuba Mountains where the incidence of the disease has always been high. The whole of this area is now covered and it only remains for sufferers to take advantage of available facilities. All the leper settlements are run on an entirely voluntary basis by making them attractive it is hoped that patients will voluntarily seek treatment and perhaps remain in the settlements so that gradually a large percentage of infectious lepers will in course of time be isolated. The system of home isolation continues to function satisfactorily in the Northern Sudan and in the words of the Report with all its defects is more satisfactory and humane than any system of compulsory or voluntary segregation.

According to published data at the end of the year there were 2,244 lepers in camps or settlements, 128 under observation or treatment and an estimated total of 8 722 cases in the whole of the Sudan. Of the total cases 5 793 are assigned to the Equatoria Province where are established the large settlements of Li Rangu and Source Yubo (see this *Bulletin* 1938 Supp. p. 116*).

11 deaths were ascribed to the disease. Of 383 persons actually bitten two were bitten by a rabid man 351 by dogs, 15 by cats, 10 by donkeys, and 2 by camels among the 11 fatal cases 9 had been bitten by dogs, one by a wild cat and one by a camel. A case of canine rabies was confirmed for the first time from the Zande District, where it is believed the disease has been prevalent among the dogs there for some time. At the Laboratory where 140 brains were received and examined, 48 were positive for Negri bodies the distribution being 29 dogs 10 donkeys, 4 oxen, and one each for sheep camel mule horse and human. The steps taken to eliminate the vector of *yellow fever* continue the *Aedes aegypti* survey has been extended to all parts of the Sudan and frequent inspections of likely breeding places carried out these inspections totalled over 4 millions during 1937. At the Laboratory work was continued along the lines previously described (see this *Bulletin* 1938, Supp. p. 117* and below under *Scientific*). Outbreaks of *influenza* of a virulent type occurred in all districts of Equatoria Province and the Nuba Mountains with high mortality while minor outbreaks of a mild type occurred in the Northern Sudan. The only available facts relate to in-patient cases these comprise 23 non-fatal European cases and 1 367 non-European cases with 18 deaths. Of *diphtheria* 36 cases were reported the disease was reported for the first time in the Equatoria Province. *Undulant fever* was responsible for 33 cases and one death 13 of the cases occurred in Kassala Province and 10 in Blue Nile Province. Nineteen cases of *scarv* 21 of *pellagra* and 274 of *acute rheumatism* were recorded. Tumours accounted for 748 cases of which 177 were defined as malignant and 571 as benign. In-patient cases of *pneumonia* numbered 2,472 and hospital deaths due to this cause 283 one non-fatal European case is mentioned.

Scientific—The Report of the *Stack Medical Research Laboratories* contributed by Dr E. S. HORGAN records that 20 541 specimens were received examined and reported upon during 1937. The results of some of these examinations have been the subject of mention in the preceding notes under such headings as *malaria enteric fever dysentery helminths venereal diseases* and *rabies*. It is necessary to refer to some of the important research activities of the Laboratories these are described in great detail in the Report under review though references for present purposes must necessarily be brief.

Although from time to time cases of *anaplasma fever* have been reported, no real clinical evidence indicated that such were Rickettsial infections. With a view to determining whether the absence of clinical typhus in the Sudan is apparent or real, during 1937 human sera were obtained from all parts of the country and rat sera from the larger centres of population in the Northern Sudan and the Weil-Felix reaction applied to 1,000 specimens of the former and 240 of the latter. The serological results appear to confirm the clinical findings that fevers of unknown origin in the Sudan are most unlikely to be due to Rickettsial infections.

Jawadzia is a clinical condition frequently met with in the Sudan but Weil's disease has not been found in any instance. During 1937 a survey among the rats in the Northern Provinces was undertaken and 200 rats were examined results failed to show any evidence of leptospiral infection among them.

The prevalence of *relapsing fever* among returning labourers frombyssinia and Eritrea provided opportunities for carrying out studies of the infecting strains. *Yellow fever* investigations continue.

G M FINDLAY of the Wellcome Bureau of Scientific Research visited the Sudan in the early months of the year and collected further series of human and animal sera from the Nuba Mountains and Sennar districts. A million doses of *vaccine lymph* were manufactured during the year. Research work included the investigation of the treatment of lymph by chloroform as a bactericidal agent and the effect of high air temperature on potency. During the year a certain amount of work on the *preservation of cultures* frozen and dried in vacuo was carried out.

Mr H. W. BEDFORD, Government Entomologist, supplies a detailed account of the year's work of the Section of Medical Entomology. In his survey of insects of medical importance he records a large increase in the numbers of mosquitoes sent in for determination. Among 3,392 specimens identified 218 were Anophelines and 3,174 Culicines of the latter 346 were *Aedes aegypti* while a species new to science *Anopheles (Myzomyia) ripiculus* was collected and described by Mr D J LEWIS and specimens new to the Sudan were also collected. Apart from insects collected from aircraft (see above *Port Health etc*) the more than 500 specimens determined included 400 tsetse flies (*G. palpalis* and *G. morsitans*) numerous fleas Tabanidae Chironomids and other biting flies. The finding of large numbers of the tick *O. savignyi* at Shambat is worthy of note. Mr D J Lewis continued his mosquito survey in the Gezira with a view to determining whether a further knowledge of the bionomics of *A. gambiae* and *A. pharoensis* under the unique Gezira conditions could add to the efficiency or reduce the cost of present control measures.

Financial—No details supplied.

MEDITERRANEAN

PALESTINE (1937)

Palestine, on the western edge of the continent of Asia at the eastern extremity of the Mediterranean Sea, is bounded by the Mediterranean on the west, Syria on the north, Trans-Jordan on the east and the Egyptian Frontier District of Sinaï on the south. It has a total area of about 10 100 sq miles (somewhat larger than that of Wales). The chief town and seat of government is Jerusalem. Other important towns are Gaza, Tel-Aviv, Acre, Jaffa and Haifa, the last two being also the chief ports. Palestine is administered under a Mandate from the League of Nations.

Total Statistics.—Including the Bedu tribes, the mid-year populations in 1937 were estimated to be Moslems 875,947 Jews 388 084 Christians 109 789 Others 11,520 making a total of 1,385,320. The tabulated facts published in great detail in the Report under review deal with the settled population only (i.e. excluding the Bedu tribes enumerated in 1931) and are as follows —

Community	Mid-year Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I M R.
Moslems	808 394	40,261	49.7	20,091	24.8	7,219	179.3
Jews	388 084	10,297	26.7	3,003	7.8	586	57.2
Christians	109 789	3 663	33.5	1 537	13.9	469	126.3
Others	11,520	508	44.1	263	22.8	61	179.1
Totals	1,316,797	54 749	41.6	*4 864	18.9	8,305	152.8

The general death rate and the infant mortality rate both show increases over the corresponding rates for 1936. It is pointed out that there is much poverty among the Arabs both in towns and villages, and that the low state of nourishment amongst Arab women is a direct cause of the increased infant mortality. Jewish death and infant mortality rates show improvement.

Of the total deaths registered 8,854 were certified as to cause by medical practitioners and of these 25 per cent were due to *respiratory affections*, 21 per cent to *diarrhoea and enteritis* and 9 per cent. to *infectious and parasitic diseases*.

Maternity and Child Welfare Work.—To the Princess Mary Maternity Wards of the Government Hospital Jerusalem 593 cases were admitted, and 542 live births, 22 stillbirths, and 4 maternal deaths recorded. In the British Section of the same Hospital there were 23 deliveries. At the Haifa Hospital 203 maternity cases were dealt with, while at the Jaffa, Nablus and Gaza Hospitals, where accommodation for maternity cases is very limited, there were 91 admissions for delivery. The District Maternity Service in the Old City Jerusalem, also dealt with 132 deliveries of women in their homes. The *Women's Clinics* at Jerusalem, Jaffa, Haifa and Nablus continued to be very popular and large numbers attended but the weekly journeys of the Lady Doctors by road to Jaffa and Nablus were not unattended with risk owing to the disturbed state of the country (see also this *Bulletin* 1938 Supp. p. 119*).

The Medical Department maintains 28 *Infant Welfare Centres* in towns and villages, participates in the administration and operation of four which are supported in part from voluntary sources maintains or controls centres under the Superintendents of Midwifery in six towns and makes an annual subvention towards the maintenance of Jewish Welfare Services. New village clinics were opened at four centres. The volume of work dealt with at different centres may be summarized as follows —

Supporting Organization	No of Centres	Children on Registers	Attendances Recorded	Home Visits by Nurses
Government and Municipal	34	9 838	298 761	95,857
Hadassah Medical Organization	15	2 492	58,911	17,697
Jewish Federation of Labour	18	2,466	38 127	3,525
Women's International				
Zionist	5	691	13 193	1,315
Local Committees	6	1 323	32,362	12 802

At the *Midwives Training School* Jerusalem Government Hospital 9 graduate nurses and 7 pupil midwives completed the course of training and 8 nurses completed the prescribed course in midwifery at the training school of the Hadassah Medical Organization. The supervision of licensed midwives and *dayas* (unqualified midwives) continued as previously described (see this *Bulletin* 1938 Supp. p. 120*). It is said that licensed midwives are finding it increasingly difficult to earn a livelihood from practice owing to the competition from hospitals, etc.

School Hygiene.—The provision for Government school medical inspections remains inadequate (see this *Bulletin* 1939 Supp. p. 120*) but within the limits of available service valuable work was done. During the year 29,989 children (out of 53 376 on the registers of 442 schools) were medically examined in town and village schools. *Trachoma* remains the most common disability met with 59 per cent of the children examined in town schools and 73 per cent in village schools suffered from this condition while 10 per cent of the children in town schools and 3 per cent in village schools suffered from other eye diseases. Three additional school nurses have been appointed and are undergoing a special course of training in ophthalmic nursing attendances of children for ophthalmic treatment during 1937 totalled 2,906,852. On account of the high prevalence of typhoid in Jerusalem about 50 per cent. of the school-children were given T.A.B. inoculation.

The usual examination of school-children for splenic enlargement was carried out among 38 792 children attending town schools the spleen rate was 1.5 per cent. and among 43,883 children in village schools 4.7 per cent.

The premises of all registered schools are inspected annually and reports made on defects affecting sanitation and hygiene overcrowding is said to be a common feature.

Lectures on hygiene were given by Medical Officers to teachers and lectures on mothercraft and hygiene given to the students at the Women's Training College and to pupils of senior classes.

Public Health Sanitation etc—Owing to financial stringency there was no material development in the services of the Department except in services for which the Government was already committed. The state of the health of both the Arab and Jewish communities was fairly satisfactory in spite of the privation experienced by the poor of both sections of the population (see *1934 Statistics* above). In spite of disturbances throughout the country *anti-malarial work* was carried out as usual. Anti-malarial drainage schemes were limited to completion of a section of the Birket Ramadan scheme draining of Birket Hanoun and filling of low land on Lake Tiberius. Local authorities carried out several works of drainage under supervision of the Department. The increased strength of the military forces and their disposition in various parts of the country necessitated control work in areas hitherto not considered essential.

The *sanitary services of the principal towns* are said to have functioned satisfactorily though it is pointed out that with the single exception of Jerusalem, main drainage does not exist. In Jerusalem lack of capital has greatly hampered the laying of lateral extensions but a number of connexions to the main sewer were effected by property owners and work on the Bethlehem road sewer was commenced. Main drainage schemes have been planned by the Consulting Engineers for a number of towns and improvements effected in some local areas. Financial provision for *village sanitation* was considerably reduced but with available funds 1,965 bore-hole and 1 149 tar barrel latrines were installed.

The *water supply of Jerusalem* functioned satisfactorily and was maintained uniformly pure by means of the softening and filtration plant which was completed (see this *Bulletin* 1938 Supp. p 121*). The reports of the Consulting Engineers upon the Tel-Aviv and Jaffa main supply schemes are being considered by Government. Experimental borings have been successful in discovering adequate and satisfactory sources of supply for Haifa. With the limited credits available for the improvement of *village water supplies* 13 approved schemes were completed.

The scheme for the *housing of labourers* in Haifa (see this *Bulletin*, 1938, Supp. p 121) was brought into effect with very satisfactory results. It is hoped that the procedure adopted in Haifa will be carried out also in Jaffa. With the passage of the Public Health (*Rules as to Food*) Ordinance the Department was enabled to exercise a much stricter control of food products of all descriptions than formerly. The *Milk Trade* shows distinct signs of improvement, but progress is hampered by the difficulty of controlling supplies of the small producer and by the lack of public demand for better milk. Large quantities of good quality butter are imported, but in some cases it is adulterated before sale to the public. Particular attention is devoted to standard requirements in respect to this and other foods. The inspection and licensing of premises, and the analyses of samples of foodstuffs were continued. Details of this work are set out in a series of tabulated statements.

The staff of the *Railway Medical Service* remained unchanged. Routine work was carried out along lines previously described. Attendances of railway personnel at clinics of Medical Officers totalled 15 463 and of these 10,572 related to new cases.

Port Health Work—A new feature relates to the development of the Tel-Aviv jetty and lighter harbour section of Jaffa Port and the organization of quarantine establishments and staff permitting the operation of services as a separate entity from those at Jaffa. Quarantine restrictions were imposed against arrivals from ports in India, Malta and Siam on account of cholera plague and smallpox in those places. An increase of shipping traffic was reported at Jaffa and Tel Aviv 1,589 vessels and 2,573 passengers were dealt with at Haifa 2,436 vessels and 35,112 passengers while 378 vessels were examined in the Acre and Gaza roadsteads.

Air traffic continues to increase and during the year 1,735 aircraft were dealt with. Supervision is carried out at Gaza, Lydda and Haifa airports towards the end of the year Tiberias on the Sea of Galilee was brought into use as a landing place for the Eastern Flying Boat Service.

The medical surveillance of travellers and immigrants entering the country was continued. 48,502 persons were dealt with and 94 per cent traced to their destinations. The Moslem pilgrimage to Mecca proceeded as usual under arrangements which have been described in previous Reports. 424 Palestinians and 24 Trans-Jordanians made the pilgrimage.

Hospitals, Dispensaries, etc.—With the exception of work upon the new Haifa General Hospital and minor alterations to existing buildings in other places, new constructions previously approved were again deferred with the result that in the absence of material increase in accommodation, gross overcrowding occurred in many Government Hospitals (see this *Bulletin* 1938 Supp. p. 122*). To provide for the needs of the increasing population in Palestine more accommodation is urgently required in a number of hospitals. The Gaza Municipal Hospital was taken over completely by the Department in lieu of the former and unsatisfactory dual control of Department and Municipality. The construction of the Knapat Cholim Hospital (Jewish) of 64 beds was completed during the year. Although all medical and health services are equally at the disposal of all sections of the community, there has been an increasing tendency during the past 8 or 9 years for Jews to seek admission to Jewish Hospitals. All infectious cases are however provided with accommodation by Government, though a limited number of cases of enteric are permitted in the Tel-Aviv Municipal Hospital.

The volume of work dealt with at various Hospitals during the year under review may be summarized as follows—

Description	Beds	Admissions				Deaths
		Moslems	Jews	Christians	Others	
8 Government Hospitals	622	9,223	1,442	2,502	—	780
Tel Aviv Municipal Hospital	234	3	6,947	4	70	453
4 Prison Sick Wards	72	831	99	54	19	4
29 Voluntary Hospitals	1,912	9,820	18,783	5,189	2,092	1,291
2 Government Mental Hospitals	157	—	4	7	—	5

Exclusive of ophthalmic and other special clinics there are 20 Government and Municipal *dispensaries and out-patient clinics* at these centres 181 487 new cases were treated, these included 9 724 cases of *eye diseases* and 1 912 cases of *malaria*. Moslems accounted for approximately 74 per cent. of the total new cases.

At the 40 *voluntary dispensaries and clinics* established in 11 towns 698 654 new cases were dealt with and these included 118 365 cases of *eye diseases* and 2 893 cases of *malaria*. At these centres Moslems were responsible for only 15 per cent. of the total new cases.

During the year 23 876 *voluntary village clinics* were held and 277 178 new cases were treated among them were 12 330 cases of *eye diseases* and 2 160 cases of *malaria*. At these centres Jewish patients were in the great majority and responsible for 95 per cent. of the total cases.

Ophthalmic clinics operated in 10 principal towns and first-aid ophthalmic clinics functioned in 21 villages with emergency clinics in 3 additional villages the mobile ophthalmic unit operated in 13 villages not served by permanent clinics. During the year 72 673 new cases were treated, *trachoma* accounting for 74 per cent. and *epidemic acute conjunctivitis* accounting for 48 per cent. of the total cases recorded. In addition the ophthalmic sections of general clinics elsewhere in the country dealt with 13 760 and the school medical service with 5 414 new cases of ophthalmic disease.

The number of *nurses in training* at hospitals recognized as training schools steadily increases during the year under review these numbered 281 of whom 128 were in the first year 91 in the second, and 62 in the third year of the prescribed course. Examinations are held twice a year 77 were successful at the first year 36 at the second year and 39 at the third year examinations in 1937.

Of *notifiable diseases* 14 531 cases with 1 634 deaths were reported the incidence of *measles externa* and *whooping cough* was approximately doubled by comparison with 1936 experience. The notes which follow briefly summarize the principal items of morbidity experience commented upon in the Report under review.

The incidence of *malaria* was not unduly high minor epidemics were reported from the vicinity of undrained marshes in a sub-district of Beersheba where 484 cases among Bedouins encamped in that area were recorded. The numbers of hospital in-patients treated for the disease are not stated but there were 4 805 cases of *malaria* treated in public dispensaries among a total of 880 141 dispensary patients treated for all causes of sickness. [In another section of the Report statements of *malaria cases treated read as follows* at Government and Municipal Dispensaries 1 912, at Voluntary Dispensaries 2 893 and at Village Clinics 2 160 making a total of 6 965 cases.] Of *black water fever* two cases and one death were recorded. Brief reference has been made to the routine anti-malarial measures and drainage work carried out (see *Public Health* above) and to the spleen surveys among school-children (*School Hygiene* above). It remains to add that among 10 883 blood films examined at the Laboratory for the presence of *malaria parasites* 693 were *P. vivax* infections 7 *P. malariae* 542 *P. falciparum* and 8 were mixed infections.

No case of *smallpox* was recorded. Protective vaccination against the disease was continued steadily throughout the year and a total of 68 381 vaccinations performed. *Cerebrospinal meningitis* was

responsible for 44 cases and 26 deaths and *acute poliomyelitis* for 18 cases with 4 deaths. *Relapsing fever* gave rise to 40 non fatal cases. Research work at the Laboratory was successful in recovering the spirochaetes of relapsing fever from ticks and subsequently effecting their passage through laboratory animals the transmission of *S. recurrentis* by *O. tholozani* to man was definitely established.

Of *typhus fever* 262 cases and 3 deaths occurred. Among 30,351 samples of serum examined at the Laboratory 404 agglutinated positively with *Proteus* X 19. There was a slight increase in the numbers of cases of *dysentery* 373 cases and 32 deaths were recorded. Among 10 193 pharyngeal swabs examined, *C. dysenteriae* was isolated 1,532 times. There was a large increase in the incidence of *measles* 7 594 cases with 669 deaths being reported but only 116 (non fatal) cases of *scarlet fever* were notified.

Five fatal cases of *rabies* occurred during the year. Anti-rabies vaccine was issued to 40 different provincial treatment centres where 2,592 persons applied for advice and 2 399 received specific treatment. Two of the treated persons died 15 days after completion of the prescribed course. The Laboratory Report contains a detailed account of the activities of the Department's anti-rabies service. For present purposes it must suffice to say that 165 cases of *rabies* among animals were reported and that 18 sub-districts and 145 localities were affected.

There was a considerable increase in the incidence of *enteric fever* 2,250 cases with 201 deaths were reported. 201 of the cases and 7 of the deaths being due to *paratyphoid*. The disease was most prevalent amongst the Arabs in the rural districts of Nablus Tulkarem and Jenin while there was no corresponding increase among the Jewish population, the incidence in Jerusalem as a whole was double that of 1936 (see also *School Hygiene* above). Incidence showed a steady monthly rise until the peak was reached about the end of August. Preventive measures were particularly handicapped in the Samaria district (where incidence still remained high in December) by delayed notifications due to the disturbed conditions. At the Laboratory where estimations of the agglutinin content of 30,531 samples of serum were made 1,344 reacted positively with *Bact. typhosum*, 156 *Bact. paratyphosum* A 165 *Bact. paratyphosum* B and 19 *Bact. paratyphosum* C. It may be noted that *paratyphoid* infections with A and B organisms are practically equal for in addition to the infections diagnosed serologically the A organism was cultivated 44 times from patient's blood, and the B organism 40 times. Research into the efficacy of anti-enteric vaccines prepared in the Central Laboratories continues (see this *Bulletin* 1938 Supp. p. 124*).

Though 373 cases and 27 deaths were reported as due to *dysentery* it is observed that notifications of the disease cannot be relied upon. Among 19 705 faecal specimens examined at the Laboratory positive findings included *E. histolytica* (free) 222 times and *E. histolytica* (cysts) 191 times. The results of cultural examination of 9,359 specimens showed *Bact. dysenteriae* Shiga present on 77 occasions, *Bact. dysenteriae* Flexner Y 438 times Strong 65 times Schmitz 51 times and Sonne 24 times.

New cases notified of *tuberculosis* are said to have numbered 547 and 237 deaths were ascribed to this cause. In another section of

The Report a classification of tuberculous cases in 1937 shows 587 cases in the towns with 172 deaths and 442 cases in villages with 9 deaths, giving grand totals of 1,029 cases and 231 deaths. In yet another place it is stated that the new cases recorded at the principal clinics numbered 331 and of these 238 were due to the *pulmonary* type of the disease the figures are said to represent the Arab community Jewish cases being dealt with by the Jewish Tuberculosis League.

The scheme for a Tuberculosis Service submitted as a result of the survey in 1935 was again postponed and it is regretted that though valuable work is being done in the out-patient departments of Hospitals there is little to report on the prevention and control of what is undoubtedly one of the most important diseases in Palestine. Among 110 specimens of sputum examined at the Laboratory 514 were positive with *Mycobacterium tuberculosis*. Notification of *phthisis* is still incomplete during the year 512 cases and 360 deaths were reported.

Ankylostomiasis shows high prevalence in many Arab villages in the orange growing areas of Jaffa and in the coastal belt. After mass treatment of the villagers re-infection occurs in the orange groves where promiscuous defaecation is common. A scheme for the sanitation of the groves was to be inaugurated in 1938. The campaign for the investigation and treatment of hookworm was continued. 1,963 persons were examined, results showing an average incidence of 48 per cent.

The investigation into the incidence and distribution of *schistosomiasis* was continued (see this *Bulletin* 1938 Supp. p. 125*). During the year 3,442 individuals were examined and of these 303 were found to be infested with *S. haematobium* and only 9 with *S. mansoni*. The Ruben River and the lower reaches of the Anja River both in the Southern District, are the principal foci of the disease. The annual Moslem festival which is held in the Ruben River area attracts many thousands of people from all districts. Treatment of infested waters and propaganda against bathing in such waters were instituted in this and other potentially dangerous areas. The following records of examinations and findings appear in the Laboratory Report—

Among 19,705 faecal specimens 1111 contained *Ascaris*, 1,816 *Trichuris*, 264 *Taenia*, 134 *Ancylostoma* and 36 *S. mansoni*; while among 41,658 specimens of urine microscopically examined only 390 contained *S. haematobium* ova.

Ten cases of *leprosy* were reported—some of these may have included recrudescences of the disease. Among 10,183 naso-pharyngeal smears examined 39 were positive with *Mycobacterium leprae*.

Veneral diseases.—The Venereal Clinics at Jerusalem, Jaffa, Haifa, and Nabulus functioned with increasing popularity. 1,696 cases of *syphilis*, 78 of *soft chancres* and 385 of *gonorrhoea* were treated during the year and 37,020 attendances for treatment were recorded. The two British Women Medical Officers have made considerable progress in extending treatment for venereal diseases amongst women though the facilities for the treatment of female patients are still inadequate. The campaign against endemic *syphilis* in the Hebron sub-district proceeded satisfactorily (see this *Bulletin* 1938 Supp. p. 126*). The appointment of a Palestinian Woman Medical Officer for work amongst women in the area is reported to have proved a signal success.

The results of the work carried out at various centres are tabulated in detail. With regard to the serological diagnosis of syphilis 1,279 out of 11,308 specimens of blood serum examined by the M.R.C. No. 1 method reacted positively. In doubtful cases Kahn tests were also applied, positive results being obtained in 196 out of 833 specimens of serum examined. Among 2,252 urethral and vaginal smears examined microscopically, 373 were found to contain *N. gonorrhoeae*.

Scientific—The Central Laboratories of the Department of Health continued to function along lines previously described (see this *Bulletin* 1938 Supp. p. 126*) but it is observed that in view of the rapid development in all branches of the Bacteriological Division extension of present accommodation will soon be imperative while a modern animal house should replace present makeshift buildings to accommodate the large numbers of experimental animals in routine use.

The Bacteriological Division reports a record year's work with 268,537 specimens submitted for routine diagnosis. The principal of these have already been referred to in the preceding notes under such headings as *malaria relapsing fever typhus helminths venereal diseases* etc. In addition the Division prepared, standardized and issued the large supplies of prophylactic vaccines etc. required in the country.

In the Entomological Division where the work is necessarily of a routine character the identification and classification of insects of medical importance was undertaken. This included the examination of mosquitos and sandflies and of fleas parasitic on rats trapped at the ports of Haifa and Jaffa. Among a total of 4,028 fleas examined 3,320 were *X. cheopis*.

The Chemical Division dealt with 12,300 samples and these included upwards of 4,000 samples of milk examined at 12 principal centres equipped for the purpose. Other work was concerned with a large number of biochemical specimens, commercial products, agricultural samples etc. submitted from a variety of sources. Findings are classified in a series of Tables.

References have already been made to the research work concerned with the efficacy of anti-enterica vaccines and the recovery of the spirochaetes of relapsing fever from ticks, etc. (see *enteric fever* and *relapsing fever* above). It remains to say that special investigations undertaken by the Chemical Division included the relation of exchangeable cations to active aluminum in the soil, and further work on the influence of neutral salts on the pH of soils.

The following scientific papers were published during the year —

- BAKER (G. W.) & PUFFLES (M.). Analytical data on Palestinian olives and olive oil — *Analyst* 1937 Vol. 62, p. 604.
 PUFFLES (M.). Some data on Mediterranean red soils — *Soil Science* 1937 No. 2, p. 44.
 — The influence of a neutral salt on the pH of soils. — *Hadar* 1937 No. 11, p. 10.

Financial—The estimated expenditure of the Department of Health for the financial year (April 1st 1937—March 31st 1938) is given as £P.215,223 a sum which represents 4.2 per cent. of the total estimated expenditure of the Government over the same period.

EMIRATE OF TRANS-JORDAN (1937)

Trans-Jordan, which is administered under the same Mandate as Palestine is a strip of country bounded on the west by Palestine, on the north by Syria, on the east by Iraq and on the south by Saudi Arabia, with access to the Red Sea at Akaba. Its area is unknown as the boundaries are not definitely determined. Amman, the capital, is on the Hedjaz railway.

Vital Statistics—No census of the population has yet been taken including the nomadic and semi-nomadic tribes the population is roughly estimated to number 300 000. During the year 11 496 *births* and 6,342 *deaths* were notified to the Department of Health, the resulting crude birth and death rates being 38.3 and 21.1 per 1,000 respectively. The *infant mortality rate* was 203 per 1 000 live births (for towns the rate was 178 and for villages 210 per 1 000 live births). The Report provides classified birth, death, and infant mortality returns for towns and villages in the various Districts: deaths are classified in eight age-groups.

Maternity and Child Welfare Work—The Government has appointed *qualified midwives* one for each of five municipalities: the towns of Amman and Es-Salt also employ one midwife each.

There are two *Infant Welfare Centres*: one at Amman, the other at Zerka. At the Amman centre 129 new cases were registered during the year: 8 767 attendances recorded and 2,465 visits paid to the homes of children. The Zerka centre is entirely administered by the Trans-Jordan Field Force: the Senior M.O. of the Force is in charge, assisted by a qualified nurse and midwife. The work is not confined to the families of the Force but extends to include civilians from neighbouring villages and Beduin tribes: over 3 000 civilians were treated during 1937.

School Hygiene—Medical Officers of Health examined 7 005 school-children and found 1,994 to be suffering from *trachoma* and 243 with enlarged spleens. Attendances at the School Ophthalmic Clinics totalled 353 460. In another section of the Report it is stated that 9,881 children were examined in 166 towns and villages and showed spleen rates ranging from 0.27.2 (the latter in Jerash District) with an average spleen rate of 10.4 per cent.

Public Health Sanitation etc—The establishment of the Department of Health was increased by the addition of one Medical Officer, three Anti Malaria Sanitary Sub-Inspectors, one Hospital Medical Attendant, one Beduin Sanitary Sub-Inspector and an Ambulance Driver for the Desert Mobile Medical Unit. Routine *anti-malarial measures* were continued throughout the country: details of the work are presented in a series of tabular statements.

The *Municipal Sanitary Services* continued to be administered by District Medical Officers and in spite of limited funds were satisfactorily maintained. In regard to *water supplies* (see also this *Bulletin* 1937 Supp. p. 119*) the following developments are noted. The installation of additional pumping machinery for the Kerak supply: the supply scheme for Ein El-Souk (Jerash town) was completed: arrangements made for a water supply scheme for the Municipality of Es-Salt: a small supply scheme completed for Ajloun Municipality: a small reservoir built in Ajloun District. Public Works Department are preparing a supply scheme for Mahas village (Es-Salt District).

Premises engaged in the manufacture and sale of *foods and drinks* are regularly inspected details of visits made are set out in a series of classified statements.

Officers of the Department of Health were responsible for the medical services of the Trans-Jordan section of the *Hedja Railway* and continued to have charge of all medical and public health services pertaining to the *Arab Legion* and *Desert Patrol Force*. The general health of the Forces was good admissions to Government Hospitals were 166 with one death and to Voluntary Hospitals 55 with one death. The *Prison Medical Service* is also a responsibility of the Health Department the health of the prisoners was reported to have been good there were 104 admissions to hospitals with two deaths.

Quarantine Services—The quarantine station at Ma'an was opened during the pilgrimage season 190 pilgrims proceeded to and 418 returned from the Hedjaz by land routes. All pilgrims before departure to the Hedjaz are vaccinated against smallpox and cholera.

Hospitals Dispensaries etc—The volume of work dealt with during the year at various treatment centres may be summarized as follows—

Item	Beds	Admissions	Deaths	Out patients (New Cases)
8 Government Hospitals	74	933	51	20 039 (Two Hospitals)
8 Government Dispensaries	—	—	—	24 218
Desert Mobile Medical Unit	—	—	—	6 491
4 Voluntary Hospitals	117	1 823	81	16 383
Electric Co. Clinic	—	—	—	1 013

The *epidemic posts* established at six centres and the *mobile epidemic unit* also dealt with a number of cases (see this *Bulletin* 1935 Supp p 107* 1936 Supp p 111*).

An excellent account is provided of the origin organization and work of the *Desert Mobile Medical Unit* which under the charge of a Medical Officer treats the Beduin sick. Out patients only are treated by the Medical Officer and his four trained Medical Orderlies. Tent Clinics are established during the year at different centres near the largest group of Beduin tents (these encampments range from 50–100 tents). The dispensary car covered over 7 000 miles during the eight and a half months of its service, and during the year upwards of 6 000 new cases were dealt with. *Eye diseases* are common and *trachoma* frequently met with *malaria* was found more particularly among those who had visited the Jordan Valley *sypkulis* occurred mainly in certain families and much of it was congenital *bilharzia* was found occasionally in the south and in all cases the disease had been contracted outside Trans-Jordan. *Anaemia* was almost universal and signs of Vitamin C deficiency were very common. *Tuberculosis* is said to be widely spread among the tribes. This is the first time work of this description has been attempted and though much of it had to be experimental, the venture seems to have been conspicuously successful.

Cases of *infectious and communicable diseases* reported to the Department of Health during the year totalled 6 508 no serious epidemic outbreak was recorded. Cases and deaths due to notifiable diseases are tabulated for each District.

New cases of *malaria* reported during the year numbered 2,791 and 4 deaths were ascribed to this cause (There were 2,791 cases with 17 deaths in the preceding year) It is stated that repetition of recorded cases occurs amongst patients seeking treatment at more than one centre At Government Clinics 1,547 cases and at Voluntary Dispensaries 1,244 cases were treated At these centres diagnosis rests chiefly on clinical symptoms and may include cases of unspecified fevers under the title of malaria. Anti-malarial measures and spleen rates etc have been subjects of brief reference in preceding sections of the present summary.

At the Government Laboratory 1,445 blood films were examined for the presence of malaria parasites 494 were *benign tertian* 203 *subtertian* 3 were *quartan* and 11 were mixed infections.

Cerebrospinal meningitis gave rise to 12 cases with 8 deaths. The special fresh serum was used in every case. There were 14 cases of *typhus fever* with one death. All cases were treated in Government Hospitals and all necessary sanitary measures taken. Of *measles* there were 538 cases and 70 deaths a large number of mild cases escape notification There were 648 cases of *influenza* with 20 deaths, 350 cases of *whooping cough* with 6 deaths and 9 non-fatal cases of *relapsing fever*.

Fevers of the *enterica* group were responsible for 208 cases and 13 deaths 185 cases and 11 deaths were due to *typhoid* and 43 cases and 2 deaths to *paratyphoid*. An outbreak occurred in two villages in the Irbid district and 59 cases were recorded in Amman there were 61 cases *Ea-Salt* 22 cases and Ma'an District 43 cases In all areas 10,250 persons were given T A B inoculations and other necessary health measures were taken At the Government Laboratory 595 specimens of blood serum were examined for the serological diagnosis of *typhoid* and *paratyphoid*. Of these 155 agglutinated *Bact typhosum* 16 *Bact paratyphosum A* 22 *Bact paratyphosum B* and 7 *Bact paratyphosum C*.

Of *dysentery* 219 non-fatal cases were notified. At the Laboratory 67 faecal specimens were cultured *Shiga's bacillus* was isolated in 6 and Flexner's in 2 cases Among 305 stools microscopically examined 5 were positive with *E histolytica* and 6 with *Endolimax Nana*.

Notified cases of *tuberculosis* (all forms) numbered 624 with 33 deaths 363 of the cases and 28 of the deaths were due to the *pulmonary* form of the disease An anti-tuberculosis campaign amongst the Beduin tribes was started after the organization of the Desert Mobile Medical Unit in April 1937 Among 85 specimens of sputum examined at the Laboratory 21 were found to contain *Mycobacterium tuberculosis*. *Pneumonia* was the cause of 156 cases and 30 deaths.

The 600 cases of *venereal diseases* reported comprised 548 cases of *siphilis* and 52 of *gonorrhoea*.

Other diseases mentioned in the Report include the following Three persons in Irbid District bitten by a rabid hyaena developed *hydrophobia* all died. Twenty three persons bitten by animals suspected of rabies received anti rabic treatment. No case of *smallpox* was reported 22,350 vaccinations were performed during the year There were 16 cases of *diphtheria* with 3 deaths at the Laboratory where 89 pharyngeal swabs were examined 3 were positive with

C. diphtheriae Twenty nine non fatal cases of *erysipelas* 130 of *mumps* and 70 of *chickenpox* were notified. The *Ophthalmic Clinic Service* (exclusive of school clinics) treated 12,913 new cases of *eye disease* and the *Voluntary Clinics* dealt with 2,379 new cases.

Scientific—At the Government Laboratory 5,281 specimens of various kinds were examined during the year. The principal specimens and findings recorded have already been mentioned in the preceding notes.

Financial—Expenditure on Department of Health Services for the year 1936-1937 was estimated at £P 15 478 or 3.3 per cent. of the total Government expenditure over the same period.

CYPRUS (1937)

Cyprus, an island in the eastern Mediterranean, lies some 40 miles south of Asia Minor 60 miles west of Syria and 240 miles north of Egypt. Its area is 3,584 sq miles (about that of Norfolk and Suffolk combined). Nicosia its capital lies near the centre of the island.

Vital Statistics—The following facts are supplied —

Area	Estimated Population	Birth Rate	Death Rate	Infant Mortality Rate
(a) <i>The Colony</i>	370 933	29.5	17.0	159.3
(b) <i>Districts</i> —				
Nicosia	120 031	28.2	16.6	146.0
Larnaca	48 705	26.5	15.5	145.0
Limassol	60 004	29.0	21.2	239.1
Pamagusta	76 235	31.6	12.8	117.7
Paphos	44 658	31.4	21.3	183.8
Kyrenia	23,302	30.6	17.2	137.8
(c) <i>Principal Towns</i> —				
Nicosia	26,821	20.9	16.4	55.2
Larnaca	13 170	23.3	19.2	159.6
Limassol	16 610	24.9	22.6	202.6
Pamagusta	11,831	20.7	10.5	122.4
Paphos	4 764	12.8	17.6	147.5
Kyrenia	2,379	43.6	21.9	38.4

A Law to amend the Births and Deaths Registration Law was passed during the year no details are supplied

European Officials resident numbered 110 with an average number resident of 77—one death was recorded during the year. *Of Cypriot Officials* there were 1,836 resident with an average number resident of 1,763. Within this group 6 were invalided and 6 died.

Maternity and Child Welfare Work—In-patients treated for conditions associated with the *puerperal state* numbered 681 with 15 deaths. 169 labour cases were dealt with in the Maternity Wards of the Nicosia Hospital and 4 maternal deaths were recorded. The *training of midwives* was continued under the direction of Dr H. SYMEONIDES. 15 pupils attended the course and all were successful at the local examination. Government Midwives and their pupils attended 363 confinements during the year. *Child Welfare Clinics* continued to function successfully in four of the six principal towns. The work of these clinics steadily increases.

School Hygiene—Satisfactory improvement in the sanitation of schools is reported. The two years course for teachers at the newly established Government Normal School includes lectures in elementary hygiene and physiology and arrangements are being made to supplement lectures by a series of practical health demonstrations. Copies of *Cyprus Public Health* published in three languages, are distributed to all Elementary and Secondary Schools.

During the year under review the services of the five Honorary Dentists were extended to the schools in 465 villages and 16,590 children were examined. In 151 schools visited for the first time a Medical Record Card system was adopted. 9,615 children were examined in these schools and only 1,917 were found to be free from dental defects. It is said that villagers appreciate the dental treatment available for their children, and that the children themselves are willing to have their teeth attended to. Full details of these services are supplied in the *Report on Dental Clinics* contributed by the Honorary Dentist.

Public Health Sanitation etc—The outstanding Public Health experience during the year was the occurrence of the severe epidemic of *cerebrospinal meningitis* to which further reference will be made in a later section of this Summary. Also during 1937 the incidence of *malaria* was somewhat higher than usual. *Anti-malarial work* is very fully described in the *Annual Report of the International Health Division of the Rockefeller Foundation* which appears as an Appendix to the Report under review.

The need for a proper *sewage disposal* system, particularly in the larger towns is said to be more apparent every day. Certain houses provided with small septic tanks lack a satisfactory means of disposing of the effluents from these tanks while there are certain trades and industries which, owing to the absence of sewers find difficulty in getting rid of their waste water etc. The increasing numbers of absorption pits are responsible for considerable soil pollution and are often unable to cope with liquid waste. At the request of the Director of Medical Services Officers of the International Health Division of the Rockefeller Foundation undertook the sanitation of the village of Dheftera in the Nicosia District and installed *bone-hole latrines* in 167 of the 237 houses in the village (with the exception of 70 houses (latrine construction impossible owing to the proximity of wells) each house has its own latrine—the only village in Cyprus of which

this can be said. It is proposed to carry out similar work in other villages. Dr ALLEN of the Near East Foundation was instrumental in obtaining a grant from the Carnegie Trust Fund for *Rural Development* in Cyprus. The scheme is to extend over three years and is to include Agricultural Educational and Health activities in two groups of villages in the Nicosia and Paphos districts. A qualified Sanitary Inspector will supervise simple works of sanitation. Trachoma Nurses and Midwives will also carry out intensive work in the villages concerned. The Government Chemist reports that 103 samples of water were examined and only 69 found to be chemically potable *water supplies*.

As a result of the cerebrospinal meningitis epidemic *housing conditions* were very carefully investigated and reported to be inadequate and unsatisfactory in many places. New legislation is to be enacted to enable the Department to deal with overcrowding and badly ventilated premises. Meanwhile the contribution of the *Mining Companies* to the solution of the housing problem in their respective areas is noteworthy for the Cyprus Mines Corporation and the Tunnel Asbestos Cement Company both embarked upon comprehensive schemes of housing for their labourers and their families. Five trained Sanitary Inspectors employed by the Cyprus Mines Corporation carry out excellent work under the able supervision of the Chief Medical Officer of the Corporation. The Tunnel Asbestos Company has also engaged a trained Sanitary Inspector.

Important legislation—The *Trades and Industries (Regulation) Law* 1937 was enacted during the year. This Law provides for the health and safety of employees in manufacturing plants shops etc. Two Committees have been at work the first enquiring into and submitting recommendations in regard to amenities and health improvements in the Health Resorts in Cyprus while the second has studied the question of nutrition in the Island.

The *School for Sanitary Inspectors* opened in November 1936 with 25 students. In March 1937 nineteen candidates sat for the examination of the Royal Sanitary Institute and eleven were successful among the latter were two Cypriot girls and an officer of the Palestine Public Health Services. Practically every successful candidate found employment.

Port Health Work—To the eight ports of arrival in the Colony 674 steamships and 608 sailing vessels entered during the year the arrivals of 35 aeroplanes were also reported.

Hospitals Dispensaries etc—Work on the new Nicosia Jubilee Hospital makes steady progress and it is expected that the building will be ready for occupation in 1939. At the Larnaca Hospital a new V.D. block a modern Tuberculosis Clinic and a Children's Ward were completed a new operating theatre was erected at the Kyrenia Hospital and additional ward accommodation and an Infant Welfare Centre were provided at the Paphos Hospital. These three hospitals are State-aided institutions. A steady increase in the work of all hospitals is again reported. In Government hospitals further development is restricted by lack of bed accommodation but with the completion of the new Nicosia Hospital this state of affairs should be rectified. The following data have been extracted from a classified statement of the volume of work dealt with during the year —

Institution	Beds and Cots	In-patients	Hospital deaths % of In-patients	" Day-cases (Out patients)"
<i>Government Hospitals —</i>				
Nicosia	107	2,027	8.5	31,793
Limasol	88	762	11.2	13,413
Mental Hospital	—	—	—	—
Leper Farm Hospital	10	57	7.0	—
<i>State-aided Hospitals</i>				
Larnaca	5	968	4.4	14,157
Pamagusta	46	699	3.6	8,186
Paphos	40	633	8.4	9,313
Kyrenia	31	644	2.1	6,829
Sanatorium	53	93	44.0	—
Totals	402	6,238	11.21	83,723

[The conflicting numerical statements appearing in the Report under review make it impossible to understand the actual position in regard to hospital patients treated during 1937. No fewer than four different statements of the numbers of in-patients are given: in the Table quoted above the figure stands at 6,238, in another place 6,584, in another 6,088, and in the classified Returns at the end of the Report it is stated "Admissions 6,421 cases treated 6,595". Furthermore in the Table above 11.21 per cent of the hospital in-patients are said to have died, yet in another classified statement only 398 hospital deaths are recorded. If the 83,723 Day-cases are to be regarded as *Out-patients* then the figure is not in agreement with two other statements which announce that 109,264 and 108,889 out-patients respectively were treated.]

There are 6 *District Dispensaries* one attached to each hospital and 11 *Rural Dispensaries* established in various parts of the Island at these centres 128,186 new and 213,337 old cases were dealt with.

Training of Nurses.—Three Cypriot girls who were sent for a three-year course of training at the American School of Nursing, Beirut, have returned and will be appointed to Government hospitals, a fourth should complete her training in 1938 and four others will commence the course during that year. It is stated that at least 95 per cent of the nurses in Cyprus have had little or no training and that present-day demands make a modern training school for nurses essential. Miss E. CROWELL, Rockefeller Foundation Staff Member in charge of Europe Nursing activities, visited the Island, investigated local conditions and submitted a memorandum on the feasibility of establishing a school of nursing when funds permit.

The notes which follow summarize the principal items of morbidity experience discussed in the Report under review.

With 18,272 reported cases in 1937 the incidence of *malaria* was higher than in the two preceding years. Among the factors responsible for high incidence are mentioned (a) the disorganization of the Medical and Sanitary Services consequent upon the severe epidemic of cerebro-spinal meningitis (see below) and (b) the extensive breeding opportunities created in certain areas caused by delay in emptying the irrigation reservoir and the resultant floods which filled depressions

and river beds. Of the 18,272 cases quoted 728 were treated as in patients with 16 deaths the types of infection being *benign tertian* 584 *quarlan* 42 *subtertian* 84 and *cachexia* 18 and among the 17,544 out patients the corresponding distribution of cases was 11,866 2,911 1,295 and 1,472 respectively. Malaria control work was carried out by the Medical Department and by the Rockefeller Foundation Staff. In an Appendix to the Report under review Dr J C CARTER contributes a comprehensive report under the title of *Annual Report of the Work of the International Health Division of the Rockefeller Foundation in Cyprus 1937*.

At the Government Laboratory where 483 blood films were examined 105 were positive with *P. falciparum* 17 *P. vivax* and 2 *P. malariae*.

The severe epidemic of *meningococcal meningitis* which commenced in the last quarter of 1936 reached its peak during the early months of 1937 continued sporadically well into the early summer and assumed mild epidemic form again during the last three months of the year. It is said that 838 cases were notified isolated and treated, and that 276 terminated fatally. (On p 88 of the Report it is stated 837 cases were notified 280 proved fatal.) Isolation hospitals were established by the Medical Department at a number of centres while in addition the Cyprus Mines Corporation erected two isolation hospitals where they treated not only cases occurring among their own employees and their families but also others from neighbouring areas. The holding of fairs etc which would tend to draw crowds was prohibited under the Quarantine Regulations schools were closed and an extensive educational programme was conducted through the Press and District Administrations. Protective immunization measures on a large scale were instituted. At the Bacteriological Laboratories of St Mary's Hospital London a vaccine was prepared from Near East strains of the meningococcus and during the last three months of the year over 30,000 persons were inoculated. This outbreak and also other epidemics of cerebrospinal meningitis that have occurred in Cyprus from 1878 to 1937 are described in great detail in a special Report contributed by Doctors E A NEFF and C S MARKIDES and presented as an Appendix in the Report under review. This has been exhaustively reviewed in the *Bulletin of Hygiene* 1939 Vol 14 pp 548 to which the reader is referred.

There were 666 cases of *typhoid fever* with 55 deaths and 34 cases of *paratyphoid A* recorded during the year. Maximum seasonal prevalence was reached in August. Kyrenia District showed the highest case incidence but the lowest mortality experience. Lack of proper latrine accommodation and the practice in rural areas of keeping manure heaps in the open thereby providing fertile breeding places for flies are mainly responsible for the disease becoming endemic in the Island. It is said that water supplies though unsatisfactory in many places play but a small part in the transmission of infection. In two villages small epidemics were water borne but the disinfection of the wells put an immediate stop to these outbreaks. The usual routine precautions were taken and T.A.B. inoculations were carried out on a large scale. There were 161 hospital in patient cases with 28 deaths of the total cases 150 were *typhoid* and 11 *paratyphoid A*. Among 180 out patient cases 170 were *typhoid* 7 *paratyphoid A* and in 3 cases the type of infection was not defined.

At the Laboratory where 736 samples of serum were tested 219 agglutinated *Bact. typhosum* 34 *Bact. paratyphosum A* and 82 *Bact. paratyphosum B*

An Appendix to the Report supplies a detailed account of typhoid fever experience during 1937

During the year 84 cases of *dysentery* were notified. Once again it is observed that as the disease shows a preference for children under the age of 5 and that seasonal prevalence is highest in the summer a considerable number of the cases may have been nothing more than ordinary summer *infantile enteritis* (see this *Bulletin* 1938 Supp p 131). Only 12 cases were treated in hospitals and of these 3 were *amoebic* 6 *bacillary* and 1 undefined as to type of infection among 58 out-patients there were 3 *amoebic* cases 34 *bacillary* and 21 undefined. At the Laboratory 144 faecal specimens were examined two were positive with *E. histolytica*.

Considerable progress can be reported in connexion with *tuberculosis* control work. A suitable site for the new Tuberculosis Sanatorium was selected and preliminary plans were prepared actual building work was expected to commence in 1938. Towards the end of 1937 the new Demetrio Tuberculosis Dispensary at Larnaca was ready to deal with patients. Dr A. D. BARDSWELL (see this *Bulletin* 1938 Supp p 131*) assisted by a Government Medical Officer and a trained tuberculosis nurse was to direct the work of the Dispensary and conduct a tuberculosis survey during 1938. Arrangements are also being made to train suitable nurses at the Larnaca Dispensary. The Philip Tuberculosis Dispensary at Nicosia under the direction of Dr T. K. EVANGELIDES continues to develop and extend its work, and it is hoped to establish a dispensary for patients from the Limassol and Paphos Districts. The *Anti-Tuberculosis League* continues to function with success and works in close co-operation with Government Medical Officers.

During the year under review 257 cases of *pulmonary tuberculosis* were notified and 137 of these were female patients. The true incidence of the disease cannot be estimated from these cases, for a certain number escape notification while others are notified owing to errors in diagnosis. Dr BARDSWELL was unable to confirm the diagnosis in 18 out of 224 notified cases. According to Hospital Returns out of 91 in-patient cases of tuberculosis (*all forms*) with 10 deaths, only 14 cases and 1 death were ascribed to the *pulmonary* form of the disease. Among 698 out-patient cases 310 were treated for pulmonary tuberculosis.

In an Appendix to the Report Dr T. Evangelides contributes a detailed account of the year's work carried out at the Philip Dispensary Nicosia and the Athalassa Sanatorium. At the Government Laboratory where 901 specimens of sputum were examined 639 were found to contain *Mycobacterium tuberculosis*.

Eie Clinus—According to the Report new cases treated by the three Travelling Oculists totalled 18 089 (given as 15,885 in another section) and of these 5,556 were *trachoma* cases. Famagusta District heads the list with 4,850 cases which include 2,892 cases of *trachoma*. There are now 18 *Trachoma Nurses* all doing useful work in their respective centres. It is hoped to introduce a Mobile Eye Clinic, an additional full-time Travelling Oculist and more nurses.

The only *helminthic diseases* recorded in the Hospital Returns are 322 cases of *ascariasis* 274 of *oxyuriasis* and 36 of *taeniasis*. It is believed that *schistosomiasis* has practically disappeared no cases were reported nor have snails been readily found in the Island. *Hydatid disease* is said to be prevalent in the cystic form and gives rise to many serious complications. Hospital Returns show that 23 in-patients with 1 death and 34 out patients were treated for hydatid of the liver. During the summer of 1937 an investigation of intestinal parasitism was conducted in some of the insanitary areas of the Island. Among 46 stools of children under 10 years of age 21 contained the ova of *Ascaris* 3 contained *Ascaris* and other parasites 1 *Enterobius*, and 1 *Hymenolepis nana*.

Leprosy.—To the Leper Farm 20 patients were admitted 17 were paroled and 4 died leaving at the end of the year 104 lepers resident.

Venereal Diseases.—In an Appendix to the Report under review Dr N. MICHAELIDES Medical Officer in Charge of V.D. Clinics contributes a survey of the work carried out at the five clinics during 1937. A classified statement shows that 2,242 cases of *gonorrhoea* 1,730 of *syphilis* 268 of *soft chancre* and 188 of other venereal diseases were dealt with. [This makes a total of 4,428 cases, but in another part of this Report it is said 4,252 patients were seen at all centres.] Of the total patients seen 2,638 were new cases. The Laboratory Report states that Wassermann tests were applied to 3,810 samples of serum with positive reactions in 745 cases.

Other diseases.—No case of *smallpox* or *plague* was reported. During the year 12,428 anti-smallpox vaccinations were performed. Anti-rat measures are carried out at all principal ports 2,250 rats were trapped all spleen smears examined at the laboratory gave negative findings. Of *diphtheria* 16 cases with 6 deaths were recorded. Hospital Returns show that 203 in-patient cases of *cancer* with 14 deaths and 241 out-patient cases were treated. In an Appendix Dr C. H. CURT the Surgical Specialist discusses the year's surgical work and among other matters describes the results of seven years of radium therapy for malignant disease the facts are tabulated in detail. The Report under review observes that 1,009 cases of *rheumatism* were dealt with during the year but Hospital Returns show 80 in-patients and 2,640 out-patients a total of 2,720 cases. A widespread epidemic of mild *influenza* occurred during the year hospital in-patients treated for this cause numbered 152 (1 death) and out-patients 6,706.

Scientific.—The Laboratory Report observes that 15,699 specimens were received and examined during the year the principal findings recorded are referred to in the preceding notes. The Government Chemist dealt with 1,462 samples during the year 1,449 of these being received from official sources including foods and drugs water etc. The 12 Special Reports which are presented as Appendices to the Annual Report under review comprise (1) Report of the Surgical Specialist (2) Report of the Cerebrospinal Meningitis Epidemics 1878-1937 (3) Report of the Pathologist (4) Report of the Chemist (5) Report of the International Health Division of the Rockefeller Foundation (6) Report on Social Work (7) Report of the Mental Hospital (8) Communicable Diseases (9) V.D. Clinics, (10) Tuberculosis Dispensary and Athalassa Sanatorium (11) Dental Report (12) Municipal Health Report Limassol.

Financial—Total expenditure on Medical Department services amounted to £60,596 a sum which represents 7·1 per cent. of the total expenditure of the Island during 1937

GIBRALTAR (1937)

Gibraltar consists of a long mountain block (the "Rock") rising to a height of 1,398 feet, 3 miles long and $\frac{1}{2}$ mile broad, joined by a low sandy isthmus to the southern extremity of Spain. The town is built on the western and southern sides of the Rock, facing the Bay of Algeciras the northern and eastern faces are inaccessible cliffs

Introductory—Dr J LOCHHEAD C.B.E. Senior Medical Officer from 1914 to 1937 retired from the Service in October of the year under review and was succeeded by Dr J E DEALE. In his first Annual Report Dr Deale pays a graceful tribute to the long and valuable services of his predecessor who was responsible for so many changes and improvements contributing to the health and welfare of the Colony

Total Statistics—The Police estimate of the resident population at the end of 1937 was 19,541 persons, comprising 16,792 British subjects and 2,749 Aliens. For the ten years previous to 1936 there was an average population of 16,700 persons, and at the end of 1937 the population exceeded the normal average by 18 per cent. The Senior Medical Officer Dr J E Deale observes, the average normal was definitely a saturation figure providing very marked overcrowding amongst the working class population, and it is particularly amongst this latter class that the majority of our present excess population is now housed

Registered births numbered 331 and *deaths* 292, the resulting crude birth and death rates being 19·5 and 14·9 per 1,000 respectively [The Report gives a birth rate of 22·7 per 1,000 but this is obtainable only by relating the registered births to the British population alone the death rate for British subjects reads 15·2 per 1,000]

Infant deaths numbered 26 and the infant mortality rate 68·2 per 1,000 births.

Maternity and Child Welfare Work—To the Maternity Wards of the Colonial Hospital 263 women were admitted of these 203 belonged to the resident population and 60 were British subjects residing in Spain, or Spanish refugees temporarily residing in Gibraltar. Of the 242 hospital births recorded 189 were the babies of resident mothers and 53 those of temporary residents, 14 of the latter being the babies of Spanish women refugees (see this *Bulletin* 1938 Supp. p. 135). At the Colonial Hospital one pupil qualified as a *midwife* and another continued her course of training in midwifery

Fortnightly meetings continued to be held at the *Child Welfare Centre* where an average attendance of 103 was recorded while 239 children were treated in the Children's Ward of the Colonial Hospital.

The Nurse paid 431 home visits during the course of the year and milk and foods were supplied free or at reduced prices in necessitous cases.

School Hygiene—During January April November and December a Nursing Sister paid 24 visits to schools in the Colony and recommended 214 children for medical and 156 for dental treatment. Of the former 73 were suffering from *skin diseases* 58 from *general debility* 28 from *defective vision* 23 from *enlarged tonsils* and 21 from *injuries*. The School Dental Officer treated 665 children for various oral defects and continued his voluntary lectures to school-children at the schools. The Soup Kitchen continued to play an important part in maintaining the nutrition of school-children during the winter months.

Public Health Sanitation etc—The medical and sanitary services of the Colony and those directly administered by the Colonial Government remain as described in previous issues of this *Supplement*. Methods of *sewage and refuse disposal* remain for all practical purposes unchanged (see this *Bulletin* 1934 Supp p 100*). Owing to the closure of the Spanish frontier difficulties were experienced in the disposal of animal manure. Steps were taken for the collection and disposal by dumping in the sea of stable refuse etc. These measures proved highly satisfactory and resulted in almost complete freedom from the fly nuisance.

With regard to *potable water supplies* it is stated that a new reservoir of one million gallons storage capacity is under construction and should be completed in 1938. Substantial renewals to catchment areas were carried out and unproved distribution of supplies to the town was made possible by the provision of larger water mains. *Brackish water* continues to be supplied from wells for purposes other than potable. Public supplies were bacteriologically tested each month and remained free from pollution throughout the year. A constant watch is kept on rain water supplies stored in tanks and liable to be contaminated.

Brief reference has been made to *overcrowding* among the working class population (see *Vital Statistics* above). The recommendations contained in the *Report of the Commission of Inquiry on Housing and Rent Restriction* referred to in the previous issue of this *Supplement* provide the basis upon which the re-housing and abolition of the slums in Gibraltar should be progressively carried out. Plans have already been prepared and schemes drafted for several years work of clearance re-housing etc. and these when completed should provide the working classes with dwellings which should be a model to the world.

The routine inspection of *foods and drinks* was carried out as usual and samples taken for analysis from time to time. Steps were taken to ensure more complete control of *milk supplies and dairies* in the Colony.

Port Health Work—The Board of Health continues to function as the quarantine authority for the Colony and for preventing the introduction of dangerous infections from the Port. During the year 5 828 vessels called and 130 cases of sickness were landed from British and 30 from foreign ships. Rats destroyed during the course of the year numbered 9 763 of these 108 were examined at the Laboratory but all gave negative findings for *P. pestis*.

Hospitals Dispensaries etc—Certain structural improvements and additions were carried out at the Colonial Hospital. The volume of work dealt with at various Government institutions may be set out as follows —

Institution	Admissions	Treated	Died	Out-patients
Colonial Hospital	1 767	1,845	141	12 068
Isolation Hospital	None	3 (leprosy)	2	—
Mental Hospital	7	80	5	—
Home for Sick and Aged	—	58	—	118 Out-door relief

The statistics of the Colonial Hospital were again appreciably influenced by the civil disturbances in Spain, the number of in-patients treated being the highest recorded during the past five years. The notes which follow briefly summarize some of the more extensive commentaries upon principal conditions of sickness treated during the year under review.

The 419 cases of *infectious diseases* recorded during the year included the following. Of *diphtheria* there were 34 cases the majority being of mild type though three more virulent infections resulted in early death. At the Laboratory where a large number of swabs were examined, 35 were new positive cases and *C. diphtheriae* was also isolated in four contact swabs. Four non fatal cases each of *scarlet fever* and *cerebrospinal meningitis* appear in the Hospital Returns. 10 cases of the former and 3 of the latter were notified during the year. An epidemic of *measles* of a mild type commenced in December and up to the end of the year alone 164 cases had been reported with no deaths. the size of the epidemic is a reflection of the overcrowded conditions and the presence of refugees in the Colony. There were also 113 cases of *German measles* recorded and 33 of *chickenpox*.

Twelve cases of *enteric fever* were reported, though Hospital Returns show that 16 cases of typhoid with 1 death, and 1 case of paratyphoid B were treated. The ages of patients ranged between 13 and 27 years. Investigations failed to establish any mutual connexion between cases and on no occasion was infection traced to either milk or water supplies. At the Laboratory of the numerous bloods serologically examined 17 agglutinated *Bact. typhosum* 18 *Bact. paratyphosum B* and 5 *Br. melitensis* (only 1 case of *undulant fever* was recorded).

Three cases of *dysentery* were notified. According to findings recorded at the Laboratory cases were chiefly due to *Bact. dysenteriae* Flexner and Sonne.

Twelve cases of *Fifth disease* (*Erythema infectiosum*) were recorded this disease had not previously been recorded in the Colony though it is thought that occasional cases may in the past, have escaped recognition. As a clinical entity the disease is said to be well established and it has been considered desirable to make it officially notifiable.

No case of *smallpox* was notified. 406 primary and 302 revaccinations were performed during the year.

Thirty four cases of *pulmonary tuberculosis* were reported and 21 deaths were ascribed to this cause during 1937. The Tuberculosis

Officer appointed in 1936 (see this *Bulletin* 1936 Supp., p 136*) appends a detailed report of his work. Towards the end of 1936 Government decided to embark upon an active anti tuberculosis campaign allotted funds to start a *Tuberculosis Dispensary* and decided to build a *Sanatorium* the building is well in hand and it is hoped it will be brought into use in 1939. At the Dispensary 44 sessions were held with an average attendance of 7 and 58 new cases were seen. At the Laboratory where 178 specimens of sputum were examined, 25 per cent were positive with *Mycobacterium tuberculosis*. The bacillus was not found in samples of cows' milk taken at regular intervals throughout the year.

The *Veneral Diseases Clinic* at the Colonial Hospital is reported to have dealt with 30 cases 13 of these being mercantile seamen. Hospital Returns of in patients show 12 cases of *syphilis* 2 of *soft chancre* and 22 of *gonococcal infections*. The usual examinations of blood for Wassermann or Kahn reactions and of smears and urine for gonococci were carried out. 75 out of 565 samples were Wassermann positive and gonococci were found in 25 out of 131 smears examined.

Though mosquito and other insect borne diseases are not endemic in the Colony (see this *Bulletin* 1937 Supp. p 128*) men are permanently employed on mosquito destruction throughout the year with additional workers during the summer months. Three cases of *malaria* were landed from British and 4 from foreign ships while among Hospital in patients 8 were suffering from the disease. Blood films of 23 patients were examined at the Laboratory and 7 were found to contain *malaria* parasites.

One case of *rabies* in a cat was discovered and the man scratched by the animal given a full course of treatment at the Colonial Hospital.

Scientific—An up-to-date *Public Health Laboratory* is maintained by the City Council an Abstract of the Annual Report of the Laboratory is contributed by Mr A G HOLBOROW F.I.C. City Analyst and Bacteriologist and included in the Report under review. During the year 5,344 specimens were examined and reported upon and of this total 1,367 were examined on behalf of the Colonial Hospital. The principal specimens examined and findings recorded have been the subject of brief mention in the preceding notes.

During 1937 a *Government Veterinary Officer* was appointed consequent upon the withdrawal of the Military Veterinary Surgeon. A Veterinary Section is included in the Report under review and in it are discussed veterinary activities of Public Health importance.

Financial—Expenditure from Government funds upon Medical and Sanitary Services during 1937 amounted to £24,338 a sum which represents 11.7 per cent. of the revenue of the Colony during the same year.

MALTESE ISLANDS (1937)

The Maltese Islands, a group of islands in the Mediterranean Sea, are distant about 53 miles from the nearest point of Sicily 80 from Syracuse 142 from Reggio and 180 from the nearest point of the mainland of Africa. Malta itself is 17 miles long 9 broad and has an area of almost 95 sq miles. Gozo 28 sq miles. Comino and Filfa are mere islets, the area of the former being about 1 sq mile. The whole group has about half the area of the Isle of Man.

vital Statistics—The recorded facts continue to be presented in admirable detail. The following brief summary supplies the fundamental items—

Item	Malta	Gozo	Both Islands
Estimated Population	233 970	25 693	264 663
Registered births	8,508	673	8,879
Birth rate per 1 000	34.3	26.2	33.5
Registered deaths	4,830	474	5,304
Death rate per 1 000	20.2	18.4	20.0
Infant deaths	1,983	170	2,153
Infant Mortality per 1 000 live births	241.9	252.6	242.7

A high birth rate is steadily maintained but the infant mortality rate continues to be excessive. The increase in infant deaths during 1937 was due to a higher incidence of diarrhoea and enteritis which was responsible for 64.4 per cent of the total infant deaths due to all causes.

Maternity and Child Welfare Work—To the Maternity Wards of the Central Hospital 427 women were admitted and 390 deliveries with 25 maternal deaths were recorded. Out of a total of 403 babies resulting from the deliveries 298 were born alive and 105 were stillborn. To the Gynaecological Department of the same hospital 408 patients were admitted and 5 died. Ante-natal consultations are held in the Out Patient Department and during the year 2,080 cases were dealt with. District Nurses of the Medical Department visited all newly confined mothers where this service is available. During the year 5 433 such visits were paid in Malta and 1,064 in Gozo. Free midwifery assistance was granted to 901 mothers during the year. Subsidies were given to two midwives, enabling them to reside within reach of outlying villages. Money grants were made to necessitous mothers with babies under one year of age.

Government continued its support to the Mothers and Infants Health Association which maintains four baby welfare centres and performs splendid work among newly confined mothers and their infants.

Sixty-eight cases of *puerperal sepsis* with 13 deaths were notified during the year.

The training of nurses and midwives is discussed in the section "Hospitals" hereafter.

School Hygiene—The School Medical Staff consists of two part time Medical Officers: one a specialist in ophthalmology (see *trachoma* below)

and the other a Lady Doctor who will become a whole time Officer in 1938. During the year under review 21,231 children were examined in Malta and 3,293 in Gozo. *Trachoma* is the disease to which the attention of school medical officers is specially directed. 297 cases were found in Malta schools and 345 in Gozo. The *nutrition* of school children receives careful consideration: a free milk ration is given daily to 5,600 children in Malta and it is hoped to provide similar free issues to the Gozo children. Dental caries, enlarged tonsils and adenoids were other conditions reported during the inspections of school-children. Daily lectures on hygiene and home nursing were given to the girls in senior classes at the Housecraft School, and weekly lectures to the pupils at the Central School, but it is desirable that the teaching of elementary hygiene should be extended to all schools.

Public Health Sanitation etc.—The Annual Report for 1937 contributed by Dr V. V. BERNARD, Chief Government Medical Officer, provides an interesting and informative review of the state of the public health, the work of the Public Health Department and of those branches of the Charitable Institution Department which were amalgamated to form the newly created *Medical and Health Department*. These new developments call for brief mention.

In 1936 the merging of the medical and health activities of the Government (at that time two separate departments) under central control was recommended as desirable and Sir Walter JOHNSON, formerly Director of Medical Services, Nigeria, was nominated by the Secretary of State to investigate and report upon the system of Medical and Public Health Administration in the Maltese Islands. The enquiry was carried out during the early part of 1937 and in addition to supporting strongly the proposals for amalgamation of the two departments, Sir Walter JOHNSON made several suggestions for the expansion of other Governmental medical and health activities. The *Medical and Health Department* came into being on the 1st November 1937 and was placed under the control of the chief Government Medical Officer to whom also were transferred the powers and duties formerly exercised by the Comptroller of Charitable Institutions. The newly created department now controls land and port health services, laboratories, hospitals and asylums, district medical services, poor relief, etc.

The importance of providing proper systems of *sewage disposal* is again emphasized (see this *Bulletin* 1938 Supp. p. 138*) during the year the sewers were extended in several towns and villages. The newly organized system for the collection and disposal of *refuse* commenced to function and is gradually being extended. Restrictions of *water supplies*, a consequence of deficient rainfall, again became necessary: additional supplies from a new source became available and the extension of old storage galleries was continued. A section of the Report discusses *housing* in some detail and contains matter of historic interest concerning the efforts directed towards housing reform in Malta from the middle of the 19th century to the present time. The routine inspections of *foods and drinks*, their manufacture and sale, etc., were continued by Sanitary Inspectors.

The Report contains a large number of Appendices and special reports containing medico-statistical statements and descriptive accounts of the various health and medical activities.

Port Health Work.—The title of Quarantine Medical Officers was changed to Port Medical Officers during the year. Rat plague was reported in countries within a few hours' journey of Malta and from which merchandise liable to carry rats or fleas is imported in large quantities. The services of the newly appointed Port Sanitary Inspector proved especially valuable in ensuring efficient watch over the condition of such merchandise, and in connexion with the inspection of wharves, warehouses, deratization, rat proofing, etc. The intensive anti-rat campaign continued (see this *Bulletin* 1938 Supp. p. 139*). During the year 2,118 steam and 399 sailing vessels entered Maltese ports, and the arrivals of 9 British and 205 foreign aircraft were recorded.

Hospitals, Dispensaries, etc.—Considerable space is devoted to the discussion of Hospitals and Institutions, and in this section Dr. Bernard contributes interesting historical notes describing the origins and subsequent development of the various hospitals and charitable institutions in Malta and Gozo. The following summary statement relates to the institutions now under the control of the Medical and Health Department, and the volume of work dealt with during the year under review.—

Institution	Admissions	Treated	Died
<i>Malta</i>			
Central Hospital	5,297	5,552	424
Santo Spirito Hospital	287	342	16
Connaught Hospital for T.B.	138	246	51
Mental Diseases Hospital	243	1,031	48
Isolation Hospital	500	521	48
Leprosy Hospital	16	93	6
Foundling Hospital	?	?	?
Hospital for Incurables and Poor	834	1,013	21
Magdalen Asylum	?	?	?
Orphan Asylum	8	110	0
<i>Gozo</i>			
Victoria Hospital	903	979	31
St. Teresa Hospital for T.B.	6	23	5
Mental Diseases Hospital	35	222	13
Isolation Hospital	52	37	1
Leprosy Hospital	15	—	—
Gozo (Aged and Invalid Poor)	37	193	31

The District Medical Service is organized on the basis of 26 districts in Malta and 5 in Gozo for purposes of medical and sanitary administration. A Medical Officer is allotted to each district (except in Valetta District where there are 2) and in practically every town or village is a dispensary. Poor patients are treated free of charge at these centres and at their homes by district medical officers, who also function as Medical Officers of Health within their respective districts. During the year under review district medical officers paid 116,091 visits to 34 dispensaries in Malta for the treatment of poor patients, and made 43,641 day and 2,088 night visits to the homes of poor patients. In Gozo 11,793 visits were recorded at 12 dispensaries and 2,328 day and 193 night visits to the homes of patients were paid.

With regard to the training of *Nurses and Midwives* and other Hospital personnel it is reported that the scheme for the establishment of a nursing School in Malta was further developed. An English trained nurse was appointed as Sister Tutor and with her assistance 12 candidates were selected for later training in England and she also started a refresher course for the Sisters at the Central Hospital. A course for Hospital Attendants was started at the Central Hospital and a similar course at the Victoria Hospital Gozo. As no candidates attended the course of *Midwifery* held in Malta, a course was started at the Victoria Hospital, Gozo in October.

A number of *Charitable Institutions* in Malta and Gozo are subsidized by Government and a number of Religious Houses and private charitable organizations are supplied with medicines free of charge.

Twenty-six diseases are compulsorily notifiable. For seven of the scheduled titles no cases were reported but for the remaining nineteen 2,972 cases with 433 deaths were recorded. The principal diseases commented upon in the Report under review include those briefly discussed in the notes which follow.

The year saw the cessation of the 1936 outbreak of *plague* (see this *Bulletin* 1936 Supp. p. 138*). Six cases with one death were notified in January 1937 one fatal case in April, and another in May. Spleen and liver smears from 13 410 rats were examined at the Laboratory and 5 found to be infected with *P. pestis*. The intensive campaign against rats is to be continued for though no plague-infected rat was discovered after May 1937 it was considered prudent to ensure that no relaxation of anti-rat measures should take place.

No case of *smallpox* was reported. District Medical Officers performed 4 440 vaccinations during the year and 92 per cent. were reported as successful.

One hundred and twenty cases of *diphtheria* with 23 deaths were recorded, 94 of the cases and 21 of the deaths occurring among children under 5 years of age. *Measles* was responsible for 8 non fatal cases only *whooping cough* 314 cases with 11 deaths, *influenza* 300 cases and 24 deaths and *scarlet fever* 22 non fatal cases.

Of *enteric fever* there were 168 cases and 27 deaths were ascribed to this cause only 4 (non-fatal) cases were reported from Gozo.

The incidence of *undulant fever* increased from 873 cases in 1936 to 1 034 cases in 1937 and deaths from 52 to 60 in the latter year. The Milk Pasteurization plant has been brought into use making available milk of guaranteed purity which is already very popular. It is intended to prohibit the sale of raw milk from centres which can be supplied by Government milk this step will see the removal of milch goats from the streets. The *Undulant Fever Research Station* continued its activities principally directed towards the investigation of the variations of *Br. melitensis* blood and milk serum agglutination tests etc. (see also this *Bulletin* 1938, Supp. p. 140* and *Bulletin of Hygiene* 1939 Vol. 14 p. 625).

Notified cases of *pulmonary tuberculosis* numbered 210 and deaths 123. The need for a co-ordinated scheme for the control of the disease is again referred to (see this *Bulletin* 1938 Supp. p. 140*). There are at present two hospitals for tuberculosis and District Medical Officers deal with out patient cases. Other respiratory

affections mentioned include *broncho-pneumonia* 207 cases, 103 deaths and *pneumonia* 112 cases with 29 deaths.

The arrangements previously made for the discovery and treatment of cases of *trachoma* were continued (see this *Bulletin* 1939, Supp. p. 140*). During the year 176 new infections were recorded in Malta and 64 in Gozo while "old" cases under treatment in these two islands were 539 and 500 respectively. Efforts are especially directed towards the detection of cases among school-children, and intensive treatment by School Medical Officers. During 1937 there were found 297 cases in Malta schools and 345 in Gozo schools. At the Ophthalmic Clinic of the Central Hospital, Malta 691 cases of the disease were treated.

Leprosy—Here again Dr. Bernard supplies a most interesting historical account of early efforts directed towards the care of lepers from the 14th century onwards. Mention has been made in the classified returns under the heading *Hospitals* above of the patients treated at the Leprosy Hospitals in Malta and Gozo. As regards the institution in the latter island, this was opened in December 1937 for the isolation of lepers in Gozo.

Veneral diseases—The Report of the Medical Officer in charge of the Venereal and Dermatological Department of the Central Hospital, Malta, observes that 36 in-patients and 230 out-patients were dealt with in the venereal diseases section during the year. Among the in-patients were 13 cases of *syphilis*, 22 of *gonorrhoea* and 1 of *condylomata*; and among out-patients 33 new and 78 old cases of *syphilis*, 81 new and 29 old cases of *gonorrhoea* and 9 cases of other V.D. This Report classifies cases in a series of Tables showing age, sex, disease, source of infection, occupations of patients, etc. together with details of drugs and treatments in use.

Scientific—Presented as Appendices to the Report under review are the *Public Health Laboratory Report* and the record of the year's work carried out at the *Clinical Laboratory of the Central Hospital, Malta*.

At the Public Health Laboratory 24,692 samples and specimens were dealt with. The principal findings recorded are presented in a series of Tables and discussed in the text of the Report. District Medical Officers and Private Practitioners submitted 4,240 samples of human blood for the serological diagnosis of undulant fever and enteric fever, 1,069 agglutinated *Br. melitensis* and 96 *Bact. typhosum*.

At the Central Hospital Laboratory 10,347 specimens were received and examined. The number and nature of different specimens examined and findings recorded are classified. Among them were 3,012 specimens of blood serum and of these 91 agglutinated *Bact. typhosum* and 147 *Br. melitensis*.

A Clinical Laboratory is also established at the Victoria Hospital, Gozo. During the year 1,517 specimens were dealt with, but findings are not recorded.

Financial—The financial year covers the period April 1937 to March 1938. Total expenditure on Medical and Health Services amounted to £221 14s.

INDIAN OCEAN

CEYLON (1937)

Ceylon, an island in the Indian Ocean, lying off the southerly extremity of India, has an area of 25 332 sq miles exclusive of the Jaffna lagoon, the area of which is 149 sq miles. Colombo, on the west coast, is the capital. Its greatest length is 270 miles from north to south, and its greatest width is 140 miles. The total area is rather more than three fourths that of Ireland.

Vital Statistics—The relevant facts may be tabulated as follows —

Races and Communities	Estimated Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
Ceylonese	5 043 000	190 487	37.7	111 656	22.1	29,855	157
Europeans	10 000	87	9.7	63	6.3	4	41
Indians†	654 000	25 493	38.4	12 691	19.0	4 321	169
Totals	5 712,000	216 079	37.8	124 210	21.7	34 180	158

†Immigrant population on estates. [The total is elsewhere given as 664 000.]

The North-Central Province again shows the highest birth death and infant mortality rates and the Western Province the lowest birth rate and the second lowest death and infant mortality rates in the Island.

The *vital statistics of urban (37 towns) and rural areas* are presented in the following detail —

Area	Estimated Population	Birth Rates	Death Rates	Death Rates per 1 000 live births	
				Maternal	Infant
<i>Urban Areas</i>					
(a) Residents and non residents	799 000	39.7	31.6	31.6	168
(b) Residents only	—	27.8	20.3	—	162
<i>Rural Areas</i>	4 913 000	37.5	20.0	17.9	157

It is again noted that in rural areas the causes of death reported cannot be regarded as reliable (see this *Bulletin* 1937 Supp. pp 134*–135*). In the 37 principal towns where the majority of deaths are certified as to cause by medical practitioners among 25 770 deaths registered *infant deaths* were responsible for 20.7 per cent, *pneumonia* 14.9 per cent, *malaria* 5.9 per cent and *pulmonary tuberculosis* for 5.2 per cent of the total.

Maternity and Child Welfare Work—This was carried out at 207 centres as compared with 77 in the preceding year. During the year under review 8,395 clinics were held and attendances by expectant mothers were 39,841 by infants 88,479 and by children of pre-school age 39,637. Infant mortality and maternal mortality rates for the Island as a whole show reduction by comparison with 1936 experience though *puerperal sepsis* and *puerperal convulsions* continue to be serious causes of maternal mortality, and in 1937 were responsible for 78.4 per cent. of the total deaths at childbirth.

At the *ante-natal clinics* held at the *De Soysa Lying-in Home* 7 942 mothers paid 11 196 visits and at the *post-natal clinics* 487 mothers paid 1 042 visits. At this Lying-in Home maternity bed accommodation was increased from 107 to 130 and 78 *Government Hospitals* had maternity wards with bed accommodation for 501 patients. A new maternity ward with 6 beds was built at Chavakachcheri Hospital other hospitals lacking maternity wards take maternity cases into their general wards.

Lady Doctors are stationed at 5 centres for work among women and children, chiefly of the Muslim population. During the year these Lady Doctors paid 3 755 home visits attended 391 mothers at child birth 479 puerperal cases, 1,859 sick expectant mothers 2,972 sick infants and 6,377 sick children of pre-school age they held also 841 clinics at 18 centres.

Registered midwives in the Island numbered 785 as against 524 in 1936. There are 225 trained midwives under supervision provided by Government. The *training of midwives* was continued at the four established centres (see this *Bulletin* 1937 Supp. p. 135*) where 61 pupils were under instruction. There are also 41 *Public Health Nurses* employed at various centres.

The *Voluntary Associations* engaged in carrying out child-welfare work increased from 48 to 60 contributions to the finances of these associations were made by 33 local authorities.

Among the *Indian population on Estates* the infant mortality rate was 169 and the maternal mortality rate 18.2 per 1 000 births. *Debility prematurity and convulsions* were the chief causes of infant mortality and of the 464 deaths of Indian mothers, 195 were due to *puerperal sepsis* principally caused by dirt and faulty midwifery.

School Hygiene—A good deal of attention is devoted to the health of school-children the staff engaged on this work comprises 81 medical officers (of whom 8 are whole time) and 9 school nurses. During the year 773 primary schools, 1,800 secondary 15 collegiate and 1 training school were visited and a total of 84 730 pupils medically examined. 66.1 per cent. of the pupils showed defects of one kind or another with an average of 2.2 defects per defective pupil. The principal defects recorded were *hookworm* 19.1 per cent., *teeth and gums* 13.6 per cent., *malnutrition* 9.7 per cent., *anaemia* 8.3 per cent., *pediculosis* (chiefly among girls) 7.5 per cent., *tonsils and adenoids* 7.3 per cent. necessary treatments were given for the correction of defects.

Special spleen and parasite surveys were carried out in selected areas where 100 children below the age of 12 were selected from schools in each of the areas and blood films taken from them every month from July onwards. The annual spleen survey of boys was carried out in March 138,776 boys were examined and gave an average spleen rate of 28.3. Work concerned with quinine administration hookworm treatment T.A.B. inoculation anti-smallpox vaccination etc. continued to be carried out along lines previously described.

Interest in *school health education* continues to be maintained and during the year 52 teachers were awarded the joint certificate of the Education and Medical Departments granted for passing the examination held after completion of the training course.

Public Health Sanitation etc.—Public health work is reported to continue to make steady progress. The *Malaria Control and Health*

Scheme inaugurated in 1936 and applied to defined areas was extended to include numerous other areas in 1937. Considerable prominence is devoted in the Report under review to describing in great detail the various aspects of the work carried out during the year. No attempt can be made in the present summary to condense the comprehensive accounts presented of areas and populations dealt with special anti malaria measures investigations and surveys constructions undertaken by the Division of Sanitary Engineering etc. for a full account of these matters the reader is referred to the Report itself.

Special attention is paid to matters concerning *sewage disposal* and the control of soil pollution. At present the most popular method of disposal of night-soil is by trenching but disposal by incineration and composting are among other methods adopted in certain areas. During the year 21 792 latrines were constructed this total includes 4 672 bucket latrines in urban areas and 16 169 deep pit latrines in rural areas. Methods of *refuse disposal* remain as previously described (see this *Bulletin* 1938 Supp. p. 143*) further supplies of dust-bins were supplied for use in Urban District and Sanitary Board towns and in some rural areas.

The provision of protected *water supplies* receives the careful consideration of the authorities and during the year 291 new public and 4,215 new private wells were constructed while improvements to 2 794 existing wells were carried out. Investigations soil surveys and borings were undertaken in connexion with proposed water supplies schemes by the Division of Sanitary Engineering. Inspections of town supplies were regularly carried out and samples of water taken for bacteriological and chemical analyses.

Housing in Urban and Sanitary Board areas is controlled and in such areas small housing schemes have been carried out. In rural areas where peasant colonization schemes are being implemented, the dwellings of settlers are constructed in accordance with type plans supplied by the Medical Department. Regular inspection of labourers lines on estates are carried out. Appreciable activity is reported in connexion with the construction and improvement of lines for the housing of labour.

Eleven Health Units continued to function throughout the year under review though no new areas were opened up existing health unit areas were extended in two cases. These areas aggregate 1,378 square miles with a total population of 898,381. The total personnel employed during the year included 11 Medical Officers of Health 5 Medical and 4 Field Medical Officers 92 Sanitary Assistants 30 Public Health Nurses, and 143 Midwives. Work continued along lines previously described (see this *Bulletin* 1938 Supp. p. 144*) and is reported to have been satisfactory in every respect.

Two *training classes for Sanitary Assistants* were conducted 40 candidates were enrolled in the first course, 36 took the final examination of the Royal Sanitary Institute and 29 were successful, while the corresponding figures for the second training course were 46 41 and 31 respectively. Two training classes were also conducted for *Public Health Nurses* at the Kalutara Totamune Health Unit.

Port Health Work (see also this *Bulletin* 1937 Supp. p. 137*) — During the year 2,788 steam and 203 sailing vessels entered the Port of Colombo and of these 44 arrived with 65 cases of infectious diseases.

7 cases were handed to the Infectious Diseases Hospital the remainder being isolated on board the ships concerned. At the 15 minor ports 579 steam and 2,391 sailing vessels called. Twenty seven cases of *Anthrax* plague were recorded in Colombo special measures have now been taken to guard against the introduction of the infection from plague infected ports.

Altogether 101 951 persons passed through the *Mandapam Quarantine Camp* in 1937 and of the total 51 427 were estate labourers the increase is attributed to the rise in the price of rubber and tea occasioning demands for additional labour. Fifty-one passengers and 49 estate labourers were rejected on account of leprosy and 5 estate labourers rejected for other diseases. 36,832 passengers and 50,943 estate labourers were vaccinated against smallpox and 42 182 labourers were treated for ankylostomiasis. At the *Talaparam Quarantine Camp* where 60 601 passengers from India were dealt with 216 were rejected, 183 of these for leprosy. During the year also 98 per cent. of the persons entering Ceylon under surveillance from Southern India reported at their destinations and completed their period of 12 days surveillance.

Hospitals Dispensaries etc—With a view to relieving the acute overcrowding of patients at certain hospitals wards of light construction each containing 32 beds were built for use in six hospitals and the provision of a further five such wards has been budgeted for in the 1937-38 estimates. Five Cottage Hospitals, each of 14 beds, are in course of construction in remote rural areas adjoining suitable central dispensaries six additional hospitals of the same type are to be erected.

The relevant facts relating to hospital accommodation and the volume of work dealt with during the year may be summarized as follows —

Province	(Number of Hospitals)	Number of Beds	Patients Admitted	Patients Treated	Hospital Deaths
Western	24	5 581	101 887	106 066	7,294
Central	23	1,807	89 316	80,009	3 065
Southern	11	662	42,336	42,532	2,496
Northern	12	642	17 317	17 699	665
Eastern	6	457	9,857	10,303	457
N. Western	6	672	31 136	32 106	2,411
N. Central	4	210	8 643	8,904	509
Uva	12	700	22,675	23 218	901
Sabragamuwa	13	1 045	40,561	41 604	1,575
Totals	114	12,046	332,948	343 442	19 723

In addition to the above general hospitals the *Prison Hospitals* (12 Prisons, Hospital bed accommodation in 9) having a total of 333 beds, 5 130 in-patients were treated with 32 deaths, and 73 348 out-patients were dealt with. At the *Lunatic Asylum* 3,942 patients were treated 881 were discharged and 281 died, while at the *House of Observation* (uncertified persons) the corresponding figures were 2,755 1 182, and 81 respectively. At the two *Leprosy Asylums* 1 166 patients received treatment, 100 were discharged and 79 died.

Central and branch *dispensaries* and visiting stations maintained by Government totalled 665 (an increase of 14) and in addition special

institutions are maintained for the treatment of *tuberculosis eye diseases* etc. At the dispensaries and out patient departments of Government hospitals 5 895 649 patients paid 8,872,871 visits for treatments *malaria helminthic diseases gastro-intestinal affections skin diseases* and ulcers were among the principal ailments dealt with. Hospitals maintained on *estates* numbered 92 (an increase of 7) and dispensaries 723 (a decrease of 10). The work at the chief Colombo and outstation hospitals is described in some detail briefly summarized the principal facts read as follows —

Hospitals etc in Colombo
General Hospital—In patients 32,373 deaths 2,755 out patients 323 Out-patient Clinic Diseases of Women new patients 1 620
 Nose and Throat Dept 10 138 new out patients Pathological Dept examined and reported upon 82,546 specimens
Dental Institute—25 198 new patients treated
De Soysa Lying in Home—10 736 in patients 6 124 live births 387 infant deaths, 180 maternal deaths Chief training school for midwives.
Victoria Memorial Eye Hospital—3 207 in patients admitted 29 967 new out patients the School Clinics dealt with 463 children.
Lady Havelock Hospital for Women and Lady Ridgeway Hospital for Children—In patients women 2,345 children 3 660 deaths of women 101 and of children 818. In the training school for Nurses 58 pupils
Female I D Hospital—In patients 428 no deaths out patients 35 501
Infectious Diseases Hospital—In patients 3 023 deaths 214

Outstation Hospitals

Kandy Hospital—Patients admitted 15 992 *Eye Institute*—1 692 in patients 12,820 out patients. Kandy Hospital is a training school for nurses 48 pupils were undergoing training during 1937
Galle Hospital—In patients 16,262, deaths 934 The Hospital is also a training school for nurses In the Eye Institute 10 907 cases were treated.

The training of nurses and midwives is undertaken at various hospitals (see above) but it is stated that the supply of trained nurses falls far short of the demand with the result that nursing staffs at many hospitals are below strength. The Training School in the New Nurses House will be started when the second stage of the building programme is completed (see this *Bulletin* 1938 Supp p 146*)

The notes which follow briefly summarize the principal items of morbidity experience commented upon at greater length in the Report under review

Malaria remains the most outstanding cause of sickness in the Island and during 1937 was responsible for 16.6 per cent of the total number of in patients treated in hospitals for all causes and for 38 per cent. of the cases dealt with as out patients at hospitals and dispensaries. The records show that by comparison with 1936 experience fewer cases were treated and deaths recorded the figures being in-patients admitted 55 755 treated 57 135 hospital deaths 1 448 and out patients treated at hospitals and dispensaries 2,251 786 Deaths due to malaria in the Island as a whole numbered 4 405 and in addition 13,918 deaths were assigned to the title *pyrexia* (unspecified)

The distribution of types of infection among the 57 135 in patients was *benign tertian* 49,311 *quartan* 1 053 *subtertian* 697 *cerebral malaria* 711 and *cachexia* 5,363

In addition to the above there were 55 cases of *blackwater fever* with 3 deaths Brief reference has already been made in the section *Public*

Health above and in previous issues of this Supplement to the extensive anti-malarial work carried out in the Island.

There were recorded 29 cases of *plague* with 28 deaths. 27 of the cases and 27 of the deaths were reported in the City of Colombo where there was a rat epizootic and 48 infected rats were detected. The usual anti plague measures continued to be energetically carried out. The Report of the Division of Medical Entomology supplies an account of rat flea surveys carried out in various areas and of the results obtained. During the course of the year 4 402 rat fleas were received at the laboratory and identified. In the areas surveyed collections of *Y. cheopis* accounted for proportions ranging between 52.4-62.8 per cent. of the total flea catch.

No cases of *cholera* were recorded during the year and only two (non fatal) cases of *smallpox*. Both of these cases (one an American and the other an Englishman) which were of the confluent type had been vaccinated prior to onset of the disease. Primary vaccinations performed during the year numbered 162,826 and of these 88 per cent. were successful.

Diphtheria was responsible for 135 cases and of these 96 cases were treated in hospitals with 22 deaths. In the Island as a whole 34 deaths were ascribed to this cause. Cases of *influenza* treated at dispensaries totalled 295 767 while hospital in-patient cases numbered 11 757 with 141 deaths. Deaths in the Island due to this cause numbered 2,067 making influenza the seventh most important cause of death during the year under review. *Measles* gave rise to 7,248 cases and 26 deaths, *chickenpox* 6 137 cases and 2 deaths, *whooping cough* 2,242 cases with 6 deaths, and *whooping cough* 662 cases with 8 deaths.

Notified cases and deaths due to *enteric fever* numbered 2 629 and 502 respectively yet 3,278 in-patient cases were treated in hospitals (3 137 being admissions during 1937) and 715 died. Of the hospital cases 2 582 were *Bact. typhosum* infections, 130 were *Bact. paratyphosum A*, 6 were *Bact. paratyphosum B* and in 560 cases the type of infection was not defined. It is said that the actual prevalence of the disease cannot be assessed from hospital records since many cases resort to ayurvedic treatment and the majority of cases probably are not notified. At the *Bacteriological Institute* where 14 696 samples of blood serum were examined 1,900 were positive with *Bact. typhosum*, H and 300 with O agglutinins, 114 with *Bact. paratyphosum A* " H and 30 with O and 283 with *Bact. paratyphosum B* H and 62 with O agglutinins.

As regards *dysentery* though only 3 711 cases and 367 deaths were notified to the Sanitary Branch, 6 037 cases were treated in hospitals (5,874 admitted during 1937) with 728 deaths. Of the hospital in-patient cases 3 093 were defined as *amoebic*, 1,564 as *bacillary* and in 1,380 cases the type of infection was not defined. These figures however are not of great value since the distinction was often made on clinical grounds only. It is added that among the small number of cases submitted to complete laboratory investigation the bacillary type greatly preponderated. The Laboratory Report shows that among 2,338 faecal specimens examined 207 were positive for *Bact. dysenteriae* and *amoebae* while 22 out of 260 specimens were positive for *E. histolytica* only.

It is to be noted that in addition to in-patient cases 27,399 out-patients received treatment for dysentery during 1937

For *tuberculosis* (all forms) 6,452 persons were treated as in-patients at Government hospitals and 1,286 died of these totals no less than 4,554 cases and 1,169 deaths were ascribed to the *pulmonary* form of the disease. At outdoor dispensaries 2,494 patients were treated. The four special institutions maintained for the treatment of pulmonary tuberculosis are—the *Anti Tuberculosis Institute* Colombo (Outdoor) *Kandana Sanatorium* Western Province the *Kankasanturai Sanatorium* Northern Province for early cases and the *Ragama Tuberculosis Hospital* Western Province for moderately advanced cases. At these institutions 1,714 in-patients were treated, 407 died and there were 3,696 out-patients. In the Island as a whole 3,145 deaths were ascribed to pulmonary tuberculosis in 1937. *Pneumonia* caused the deaths of 11,008 persons in Ceylon during the year under review. Hospital cases of the disease numbered 8,739 with 2,985 deaths; there were also 4,644 in-patient cases of *broncho-pneumonia* with 1,285 deaths and 8,446 cases of *bronchitis* with 358 deaths.

Leprosy—During the course of the year surveys were carried out in selected areas in four Provinces and in addition 30,411 children were examined in 208 schools when 16 cases were detected. Fifteen treatment centres were operating during the year in the Western, Eastern and Southern Provinces and at these Clinics there were 440 cases under treatment and 552 under observation. At Government Hospitals 1,292 in-patient cases were treated with 84 deaths. Comprehensive reports describe the year's work at the two Leper Asylums in the Island and from these reports the following data have been extracted—

Leper Asylum	Admitted	Treated	Discharged	Died
Mantova	57	242	21	13
Hendala —				
Ceylonese	129	792	39	53
Indians	30	132	40	11

At the Laboratory where 9 smears were examined only 1 was positive with *Mycobacterium leprae*.

Helminthic Diseases—In the Island as a whole 1,708 deaths were ascribed to *ankylostomiasis* and 3,502 to other intestinal parasites during 1937. The Hookworm Campaign was more intensively conducted and the following treatments recorded—

At Government Institutions	1,443,893
At outside Institutions	30,483
By Campaign Staffs	488,329
Health Units	62,150
Mandapam Camp	42,182
Estate Medical Staffs	96,336
Total	2,163,373

Hospital Returns show that 15,733 in-patients were treated for *ankylostomiasis* and that 462 hospital deaths were assigned to this

cause. Among hospital records also appear 3 168 cases of *ascariasis* with 266 deaths.

An Island survey of *filaria*s was undertaken. Work commenced in April and by the end of the year the whole of the North Western Province and the Hambantota District of the Southern Province had been surveyed. Results are described in some detail but limits of space prohibit their repetition in these pages. It was noted that 34 per cent of the blood films examined in one area were positive for *Microfilaria malaya* as the water plant *Pistia stratiotes* is held responsible for the propagation of the intermediate mosquito hosts, steps are being taken for the removal of the *Pistia* plant throughout the Island. This survey work continues. During the year 134 cases of filarial diseases were admitted to hospitals 2 died and there were also 96 out patient cases.

Venereal Diseases.—In patients treated at the various hospitals numbered 7 675 (with 81 deaths) and out patients 31,871. The distribution of infections among in-patient cases shows 2,382 cases of *syphilis* 296 of *soft chancre* and 5 027 of *gonococcal infections*. At the five special V.D. Clinics cases dealt with were as follows —

Clinic	Syphilis	Gonorrhoea	Other V.D.	Yaws
Colombo —				
General Hospital	1,333	3 171	18†	—
Fort Clinic for Seamen	40	29	—	—
Female Branch Hospital	745	753	455	—
Kandy Dispensary	120	19	6	3
Galle Dispensary	649	—	—	—

[† In addition 111,005 other cases are mentioned—probably a printer error.]

In-patient cases of *yaws* numbered 944 and at dispensaries 9 061 persons were treated. Nine deaths in the Island were due to this cause. Under the Malaria Control and Health Scheme each of the Field Medical Officers and Medical Officers of Health is responsible for the control of the disease in his area, while in other areas two whole-time Medical Officers carry on along similar lines. Each case is "carded," re-examined every six months and necessary treatment given.

Other diseases mentioned in the Report under review include the following. Hospital cases of *cancer* numbered 1,512 and hospital deaths due to this cause 168. the Registrar-General records 612 deaths under the title *Cancer and other tumours*. For *intestinal disorders* 9,830 persons were treated as in-patients and 1 194 died, for *rheumatism* 4,641 cases with 5 deaths, and for *nephritis* 3,560 cases with 637 deaths.

Scientific.—The Report of the *Bacteriological Institute* provides the usual classified statements and description of specimens received and examined and results obtained. during the year 38,294 specimens were dealt with and 115 437 doses of various vaccines prepared and issued.

At the *Pasteur Institute* 2,173 persons received preventive inoculations against *rabies*. 1 030 of these were in patients. Brains from dogs and other animals examined during the year numbered 478. of these 212 were positive with *Negri* bodies.

A considerable amount of *research work* in connexion with *nutritional* problems was carried out during the year and the results published as follows —

Report on Nutrition in Ceylon.—Sessional Paper II 1937

Further report on Nutrition in Ceylon.—Sessional Paper XXIV 1937

Vitamin A as determined by the Blue Units of the antimony trichloride test in the livers of malnourished children.—*Indian Medical Gazette* 1937 Vol 72, No 5

The Report of the *Division of Medical Entomology* describes in great detail the activities of the Division during the year. Considerable extension of work staff, equipment and laboratory accommodation is reported and described thereafter the Report proceeds to discuss at length the work carried out at the Malaria Observation Stations Mosquito and Rat flea Surveys and the Filaria Survey.

Scientific papers and books published by members of the staff of the Department of Medical and Sanitary Services included the following —

BLAZE (J. R.) Fatal Coronary Thrombosis in a man aged 25 years —*Brit Med J* 1937 Vol 2 p 14

GUNewardene (S. R.) Book in Sinhalese "Care of the Sick" for the use of the Hospital attendants

NICHOLLS (Lucius) *Framboesia tropica*—a short review of a Colonial Report concerning Statistics and *Hippelates flavipes*—*Annals of Tropical Medicine & Parasitology* 1936 Vol 30 No 3

The following publications appeared in the *Journal of the Ceylon Branch of the British Medical Association* for 1937 —

ATTYALLE (N.) The problem of carcinoma of the uterus in Ceylon

BLAZE (John R.) Heart disease in Ceylon.

FERNANDO (P. B.) Notes on a case of Encephalitis Lethargica.

GUNewardene (H. O.) Cardiovascular Autonomic Dystonia.

JAYASURIYA (J. H. F.) A case of Advanced Lymphosarcoma.

JAYAWARDENE (M. D. S.) A case of Congenital Heart Disease

PAUL (Milroy) Cure of a large Aneurysm by direct repair of the Arterial wall.

RAMANATHAN (S.) Notes on an interesting case of Acute Abdomen.

— A fatal case of Malignant Melanoma.

SENANYAKE (I. A.) Evolution of Mental Treatment.

SILVA (Stanley de) Malaria in the child.

SILVA (C. C. de) Hereditary Ectodermal Dysplasia.

VAN ROOYEN (C. A.) Reflections on the Malaria epidemic 1934-35

WIJERAMA (E. M.) The mode of onset of the malaria epidemic in Ceylon 1934-35

Medical Education—The following figures relate to the work of the Ceylon Medical College during 1937 —

Results of Examinations

Medical	Sat	Passed	Apothecaries	Sat	Passed	Mid-wives	Sat	Passed
Pre-medical	70	28	1st Apothecaries	42	22	Class I	44	30
1st Professional	60	34	2nd Apothecaries	28	14	Class II	81	65
2nd Professional	50	42	Pharmacists	22	12			
Final	50	27						

Financial—Estimated expenditure on Medical and Sanitary Services for the year 1936-37 was Rs.11,262,132, and actual expenditure amounted to Rs.11,085,271. The latter figure which represents 9.3 per cent. of the total revenue of the Island during the year does not include the cost of new buildings, or improvements to or maintenance of existing buildings.

MAURITIUS (1937).

Mauritius, an island in the Indian Ocean, is distant 500 miles from Madagascar, 834 from Seychelles, 1,300 from Natal, and 2,300 from the Cape of Good Hope. It has an extreme length of 39 miles north to south, and 29 miles extreme breadth east to west. Its area is about 720 sq. miles, equal to that of Surrey.

Vital Statistics.—The relevant facts, showing District distribution, are as follows:—

District	3rd-Year Population	Birth Rate	Death Rate	Infant Mortality Rate
Port Louis	55,791	39.3	32.6	—
Pamplemousses	35,322	29.4	31.3	—
Rivière de Rempart	32,276	34.2	27.0	—
Flacq	51,078	30.9	32.6	—
Grand Port	48,078	37.6	31.6	—
Plaines Wilhems	103,477	40.9	28.6	—
Beaune	30,683	37.4	22.5	—
Moka	29,774	30.6	23.1	—
Black River	13,270	27.3	36.7	—
The Colony	339,897	35.2	28.6	134.5

It is of interest to note that in the Black River District where the lowest birth rate and highest death rate in the Colony are recorded (and a District where the death rate greatly exceeds the birth rate) density of population is only 131.4 per square mile as against a density of 3,488.9 persons in Port Louis, and 1,328.6 persons in Plaines Wilhems. In the Colony as a whole the Indian population contributed 66 per cent. of the total births and 69 per cent. of the total deaths recorded.

Maternity and Child Welfare Work.—The two Societies, the *Maternity and Child Welfare Society* and the *Gowrie de Laet* continued to function successfully and were afforded the usual financial support by the Government (see this *Bulletin* 1937 Supp. p. 146*). The eight Government midwives attended 962 confinements and paid 4,701 house visits during the year. In the Hospital Returns it is noted that only 277 women were treated as in-patients for conditions associated with the puerperal state, and of these 160 were cases of normal labour. In the preceding year the corresponding figures were 1,878 and 1,050 respectively. The experiences in the two years differ so strikingly as to call for comment—unless the explanation lies in typographical

errors. During the year under review 169 deaths were registered as due to the puerperal state as compared with 145 deaths in the preceding year.

School Hygiene—The only information supplied which comes under this heading refers to the spleen rates of school-children the following Table summarizes the more detailed results recorded —

District	Children examined		Spleen Rates	
	1908	1937	1908	1937
Port Louis	—	1 017	—	14.1
Pamplemousses	566	1 408	65.7	31.4
Rivière du Rempart	—	1,321	—	16.1
Flacq	1 169	1 570	67.2	40.1
Grand Port	894	852	39.7	9.8
Plaines Wilhems	1 042	1 754	8.9	1.1
Savanne	420	692	29.1	9.6
Moka	393	663	13.6	0.5
Black River	275	288	41.1	33.1
The Colony	—	—	40.1	17.6

The general diminution of rates since 1908 is striking and the conclusion drawn from the above results is that the whole Island has changed from one of high endemicity to one of moderate endemicity.

Dr H ANDRÉ continued his work on Health Centre lines in the District of Pamplemousses. In four areas he examined 2,204 school children and found 408 with enlarged spleens.

Public Health Sanitation etc—No important administrative developments were recorded during the year under review the public health was good on the whole. *Anti-malarial* work continued to be carried out with unabated energy especially in the central plateau where the Malaria Branch of the Department aims at bringing this region under complete control and so provide in this area permanently healthy living conditions for the inhabitants who constitute one-quarter of the total population of the colony. For all practical purposes *sewage and refuse disposal* provision of *water supplies* etc remain unchanged (see this Bulletin 1936 Supp p 142* 1937 Supp p. 147* and 1938 Supp pp 151-152*).

With regard to *labour conditions* it is said the wages of agricultural workers were increased, plenty of employment was on offer the general health of labourers was about the average with cases of severe malnutrition extremely rare. The references to *food and drugs in relation to health and disease* remain unchanged.

The *training of sanitary personnel* was continued six candidates for sanitary posts were undergoing the course. In an Appendix to the Report under review details are supplied of the sanitary work carried out in rural areas.

Port Health Work—During the year 223 vessels arrived and 19 110 members of crews and 2,402 passengers were examined. Eighty two vessels arriving from infected ports were detained for purposes of disinfection and fumigation. In an Appendix to the Annual Report the Medical Officer of Health Port Louis provides details of anti plague precautions in and near the harbour area.

Hospitals Dispensaries etc—It is stated that Hospitals are still inadequately staffed suitable candidates for hospital posts are not available in sufficient numbers to make up normal wastages in establishment The volume of work dealt with at the various hospitals and institutions in the Colony is summarized in the Table below —

Institution	Beds	Admitted	Treated	Deaths
<i>Hospitals—</i>				
Civil	300	7,910	8,057	498
Long Mountain	65	2,028	2,047	81
Poudre d'Or	70	1,691	1,719	60
Flacq	66	2,173	2,166	117
Mahebourg	108	3,054	3,100	159
Souillac	103	334	2,417	113
Victoria	234	5,681	5,789	315
Moka	83	1,586	1,614	88
Mental	64	229	233	36
Barkly Industrial School	12	187	187	—
<i>Prisons—</i>				
Port Louis	16	300	303	4
Beau Bassin	32	303	319	5
Totals	1,180	27,517	27,968	1,476

There are 38 *Estate Hospitals* in the Colony no details of the work carried out at these institutions are supplied.

New cases dealt with at *dispensaries* and *hospital out-patient departments* numbered 211,244 and 258,575 attendances were recorded.

The notes which follow briefly summarize the references made in the Report to some of the principal items of morbidity experience during 1937.

Patients suffering from *malaria* and admitted to hospitals numbered 3,158 (3,196 treated) and 122 hospital deaths were ascribed to this cause in addition there were 47,294 *out-patient* cases. Over 11 per cent of the total hospital admissions for all causes of sickness were malaria cases while among out patients the proportion was 22 per cent. In the Colony as a whole 2,139 deaths were registered as due to malaria. The distribution of types of infection among in- and out patients reads as follows —

Infection	In-patients	Deaths	Out patients
Benign tertian	2,000	42	—
Quartan	70	—	—
Ch. tertian	78	7	—
Cachexia	628	66	3,460
Blackwater	41	9	1
Unclassified	382	3	43,822
Totals	3,196	122	47,294

Among 101 blood films examined at the Bacteriological Laboratory 14 contained *P. falciparum* 1 *P. vivax* and in 86 no parasites were found.

In an Appendix Dr L. J. MCGREGOR contributes the annual report of the Malaria Branch of the Medical Department.

No case of *plague* or *smallpox* was reported during the year. Anti-plague measures continued to be carried out. 10 228 children were vaccinated by Government Vaccinators. Of *diphtheria* 33 cases were notified. 11 cases were treated in hospital and 2 died. At the Laboratory where 331 throat and nasal swabs were cultured 38 were positive with *C. diphtheriae* and the same organism was identified in 15 out of 70 specimens microscopically examined.

An outbreak of *influenza* in June and July gave rise to some anxiety but the disease proved to be mild in type. In patient cases numbered 1 140 with 34 deaths and 28,542 persons received out-patient treatment. Deaths due to *influenza* in the Colony numbered 440.

During the year under review 80 cases of *enteric fever* were notified to the Sanitary Authority but notified cases are no reliable indication of incidence. For example Plaines Wilhems is the most salubrious district in the Colony and it has the safest water supply yet year after year notifications from this district may equal or exceed notifications from all other districts combined. (In 1937 Plaines Wilhems notifications numbered 36 and all other districts combined 44.) In rural areas where few medical practitioners are domiciled fevers of the enterica group may occur but are not notified. Hospital Returns show among in-patients 43 cases of *typhoid* with 14 deaths. 2 non-fatal cases of *paratyphoid A* and 7 cases in which the type of infection was not defined. Among 297 samples of serum submitted for agglutination tests at the Laboratory 82 agglutinated *Bact. typhosum* H and 63 *Bact. typhosum* O. [The wording of this part of the Report is peculiar. Under agglutination tests it is recorded — Agglutinated by *Bact. typhosum* H serum 82 etc. This would suggest that cultures of bacteria were sent for examination but later in the section the total number of sera submitted for examination is given and evidently the figures throughout refer to sera. No doubt the tests were correctly performed, but in the interests of scientific accuracy they should be correctly reported.]

Hospital Returns show that 712 persons were treated as in-patients for *dysentery* and 57 died while there were also 4 263 out-patient cases. Among in-patients types of infection were *amoebic* 421 cases *bacillary* 174 and unclassified 117 the corresponding figures for out-patients being 3 105 36 and 1 122 respectively. Other intestinal ailments dealt with during the year included 532 in-patient cases of *diarrhoea* and *enteritis* with 79 deaths, and under the same title 5 779 out-patient cases.

At the Laboratory where 50 faecal specimens were cultured 6 were positive with *Bact. dysenteriae* Flexner and 1 *Bact. dysenteriae* Sonne while among 1 375 faecal specimens microscopically examined *E. histolytica* was identified 77 times and *E. coli* 87 times.

Among the *deficiency diseases* recorded during the year were 102 in-patient cases of *beriberi* 3 of *pellagra* and 3 of *ricketts* and among out-patients 67 cases of *beriberi* 14 of *ricketts* and 7 of *pellagra*. In March 1937 an outbreak of *beriberi* occurred in the Central Prison Beau Bassin and 14 cases were recorded. Later the disease appeared among the prisoners of the Port Louis Prison as well. The following facts present the salient features of these occurrences —

Month	Central Prison, Beau Bassin	Port Louis Prison.
	Cases.	Cases
March	14	—
April	24	8
May	25	15
June	20	10

The outbreak subsided after June but from first to last 144 cases and 5 deaths were recorded. A Committee of Enquiry was appointed to investigate the outbreak their recommendations were adopted and improvement immediately followed.

Diseases of the respiratory system (exclusive of tuberculosis) killed 2,209 persons in 1937 this group was therefore responsible for over 19 per cent of the total deaths due to all causes in the Colony. Within this group the pneumonias were responsible for 1,470 deaths, and all forms of bronchitis for 584 deaths. Tuberculosis (all forms) caused the deaths of 329 persons during the year under review. With regard to hospital treatments for these cases the following data have been extracted from the 1937 Hospital Returns —

Disease	In-patients		Out patients
	Cases	Deaths	Cases
Tuberculosis—pulmonary	437	65	1,544
—other forms	57	8	301
Total	494	73	1,845
Bronchitis	935	48	5,003
The Pneumonias	595	178	463

Among 451 specimens of sputum examined at the Laboratory 98 were positive with *Mycob. tuberculosis*.

Although treatment for *ankylostomiasis* has been actively carried out on mass treatment lines since 1924 the infection is still apparently as widespread as ever in the rural areas. Cases treated at hospitals and dispensaries during the year numbered 18,515 and of these 2,035 were in-patients and 50 died. The usual *Annual Report of the Hookworm Branch* appears as an Appendix to the Annual Report under review. 2,364 persons were examined and 609 were found to be infected with hookworm. As regards *schistosomiasis* it is stated that adequate control measures cannot be undertaken until a systematic field investigation has been carried out. Fifty in-patient cases of *schistosomiasis* and 228 out patient cases were dealt with during the year. *Ascariasis* is a common infection. 199 in-patient and 7,235 out-patient cases are mentioned. At the Laboratory among 1,375 faecal specimens examined 863 contained *Trichuris ova*, 587 *ankylostome* and 225 *Ascaris*.

The *Annual Report of the Leper Hospital* contributed by Dr H. ANDRÉ appears as an Appendix. Four lepers were admitted during the year 1 died 4 were discharged, leaving 48 inmates resident at

the end of the year. A statement is supplied showing the type of leprosy, progress and condition etc. of each of the 48 cases. There are also 25 lepers in the Dependency of Rodrigues; details of each case are supplied with respect to sex, age, type, etc.

Veneral Diseases treated at hospitals and dispensaries were as in patients for *syphilis* 215 and for *gonococcal infections* 188 cases; among out patients were 1 086 cases of *syphilis*, 265 of *soft chancre* and 869 *gonococcal infections*. At the Laboratory, where 3 915 samples of blood serum were Kahn tested, 825 gave positive and 292 doubtful reactions. *N. gonorrhoeae* was present in 17 out of 79 specimens of pus etc. examined.

Scientific—Owing to prolonged illness of the Pathologist Dr H D TOUJAG, the Report of the Bacteriological Laboratory takes a more abbreviated form than usual. Altogether 8 276 specimens were received, examined and reported upon; the more important of these have been the subject of brief mention in various sections of the preceding notes.

Scientific papers published by members of the Staff of the Medical and Health Department included the following—

WERN (J. L.) On the occurrence of dysentery like organisms in the Urinary Tract of man in Mauritius.—*Jour Hygiene* Vol. 37 No. 2, 1937.

— The helminths of the intestinal canal of man in Mauritius and a first record of *Trichostrongylus axei* locally.—*Jour Parasitol* Vol. 29 No. 4 p. 469.

— *Bertiella stuederi* infestation of man in Mauritius.—*Lab Jour* 1937 December.

GIBERT (S.) Notes on the viability of *Anopheles costalis* ova subjected to natural desiccation.—*Trans Roy Soc Trop Med & Hyg* Vol. 31 p. 115.

— Notes on Filariasis and its transmission by Mauritian Anophelines.—*Trans Roy Soc Trop Med & Hyg* Vol. 30 p. 477.

The following is a list of the Special Reports which appear as Appendices to the Annual Report under review—Annual Reports of The Bacteriological Laboratory, The Government Analyst, The Hookworm Branch, The Malaria Branch, The Medical Officer of Health, Port Louis, The Mental Hospital, The Leper Hospital, The Radiologist, The Medical Officer, Rodrigues.

Financial—Total expenditure on Medical and Sanitary Services during 1937 amounted to Rs. 1 585,275, a sum which represents approximately 10 per cent of the revenue of the Colony during the same period.

SEYCHELLES (1937)

The Seychelles Islands, 92 in number, are situated in the Indian Ocean between 4° and 10° S latitude. Their total area is estimated as 156 sq miles. Mahé, the largest, is 17 miles long and 3 to 7 broad, with an area of 56 sq miles.

Vital Statistics—The estimated population at the end of the year was 30 940. Registered births numbered 827 and deaths 440; the resulting crude birth and death rates being 28.7 and 14.2 per 1 000.

respectively. Infant deaths numbered 67 and the infant mortality rate 81 per 1 000 live births. [By comparison with 1936 experience the crude death rate and the infant mortality rate show increases.]

Neither the numbers of the *general European population* nor of *European Officials* are supplied. During the year 3 Europeans died and 845 officials from various Government Departments were treated at Headquarters in Victoria. officials treated by Assistant Medical Officers in the Districts are not included. [During the preceding year 632 officials were treated at Headquarters.]

Maternity and Child Welfare Work—To the Maternity Section of the Seychelles Hospital 295 patients were admitted. in the 240 normal labour cases birth was given to 224 live babies. there were 11 stillbirths, and 3 maternal deaths. At the Cottage Hospital Praslin the 44 patients in the Maternity Section included 37 labour cases. 34 live births were recorded.

Ante-natal and Infant Welfare Clinics continued to be held as previously described (see this *Bulletin* 1936, Supp. p. 157*) and 114 women and 536 children attended these centres during the year. The training of probationer nurses continued to be carried out at the Seychelles Hospital, the course of training covering three years.

School Hygiene—There are now 29 grant-in-aid elementary schools controlled by Government and 2 secondary schools not under Government control. Government-controlled schools were inspected periodically by Medical Officers during the year. The principal findings recorded were as follows—

	Schools of		
	Mahé	Praslin	La Digue
Number examined	942	290	161
Defects noted (percentages) —			
Lack of cleanliness	10.6	20.7	14.6
Nutritional deficiencies	11.1	11.4	12.0
Dental caries, etc.	26.2	6.9	2.1
Intestinal parasites	69.9	9.4	9.5
Enlarged tonsils, etc.	11.4	1.9	1.2
Skin diseases	7.0	4.6	3.9

It is stated also that among the children attending Mahé schools 75 per cent. showed diseases of the nervous system and 37 per cent. diseases of the circulatory system.

Children in Government-controlled schools receive regular instruction in elementary hygiene.

Public Health Sanitation etc.—Dr E. M. LAMIER, Senior Medical Officer, reports that the health of the population was "fairly good," with the prevalence of influenzal and respiratory affections at times high. [It has been observed (see *Vital Statistics* above) that general mortality and infant mortality rates were higher than in 1936. more in- and out-patient hospital treatments were also recorded than in the preceding year.] The health value which would follow the establishment of hull stations for the use of residents during the hot weather months is again emphasized (see this *Bulletin* 1936, Supp. p. 158*).

The responsibilities of the Victoria Town Board and the Local Boards of Health in regard to general measures of sanitation remain as previously described. Methods of *sewage and refuse disposal* are unchanged. It is said that the number of septic tank installations in private houses is increasing. At ordinary times the *water supplies* of the Colony are adequate and free from pathogenic organisms. After heavy rains it has been noted that the incidence of bowel diseases appears higher and at such times the filtering and boiling of the water becomes necessary. Reference is again made to the need for the appointment of a ranger to patrol the water reserves (see this *Bulletin* 1938 Supp. p. 157*). The comments upon the Seychellois labourers remain as previously described. Towards the end of the year a mild outbreak of polyneuritis of obscure origin was reported among the labourers on the island of Coetivy. The outbreak was investigated and was thought to have been of toxic origin. The outbreak subsided and no fatality was reported.

The usual routine inspections of *foods* etc. exposed for sale were continued. During the year the restrictions placed on the manufacture of toddy were removed. In a country where polished rice is widely used the drinking of toddy in moderation provides a valuable addition to the usual diet for toddy yeast is rich in Vitamin B complex. The removal of restrictions on the manufacture may result in the improvement of the state of nutrition of the people of the Colony if proper use is made of this valuable food.

The training of sanitary personnel was continued. Lectures and demonstrations are given throughout the year on all subjects necessary for the efficient performance of duties by sanitary inspectors.

Recommendations for future work repeat the recommendations made in the 1936 Report (see this *Bulletin* 1938 Supp. pp. 158*-159*).

Port Health Work—The constitution and organization of the Port Sanitary Authority remain unchanged. During the year 58 vessels called at Mahé and 450 passengers entered the Colony. One ship was placed in full quarantine and 18 saloon passengers were accommodated on Quarantine Island. The accommodation in the Island is inadequate in view of the development of the tourist industry and the increasing number of passengers landing in Mahé.

Hospitals Dispensaries etc.—The volume of work dealt with during the year at various Government institutions may be summarized as follows:—

Institution	In patients			Out-patients
	Admitted	Treated	Died	Treated
Seychelles Hospital, Victoria	1,395	1,413	19	6,464
Cottage Hospital, Praslin	89	7	3	—
Lunatic Asylum	6	37	—	—
Pauper Asylum	63	68	42	—
Dispensary South Mahé	—	—	—	2,753
" Bay St. Anne	—	—	—	1,606
" Grand Anse	—	—	—	345
" La Digue	—	—	—	512

Malaria does not exist in the Colony, but three imported cases were treated in the Seychelles Hospital. The measures taken to prevent possible introduction of anophelines continued to be applied (see this *Bulletin* 1938 Supp. p. 159*). Sporadic cases of *dengue fever* occur from time to time—only 1 hospital case is recorded. It is again stated that *elephantiasis* of the legs and scrotum is not uncommon and that cases of *lymphangitis* and *hydrocele* probably of filarial origin, are frequently seen.

Influenza is said to be very prevalent at certain times of the year. 62 cases were treated in hospital and 6 deaths in the Colony were ascribed to this cause.

Dysentery was responsible for 20 hospital cases, all of the *amoebic* type and 2 deaths were registered under this title in the Colony. In the returns of the Praslin Cottage Hospital 4 cases of *amoebic hepatitis* and 1 of *amoebic dysentery* are mentioned. At the Seychelles Hospital 45 patients were treated for *diarrhoea and enteritis* and 2 died.

Five cases of *pulmonary tuberculosis* and 3 of other forms of the disease were treated in the Seychelles Hospital, and 18 deaths were registered in the Colony as due to tuberculosis of the respiratory system. Other respiratory affections mentioned in the Seychelles Hospital Returns included 14 cases of *bronchitis* and 18 of *pneumonia*. Deaths in the Colony due to pneumonia numbered 22, and to bronchitis 5.

Antylostromiasis continues to be responsible for the majority of the cases of secondary anaemia and chronic ill-health seen among the poorer classes and natives (see this *Bulletin* 1938, Supp. p. 160*). Mass treatment at regular weekly intervals was carried out at 17 centres. [It is stated that the number of patients treated totalled 17 063 (in a total population of 30,940) while in another place a total of 17 063 treatments is mentioned.]

The incidence of *leprosy* remains high. During the year 6 new cases were discovered, 1 during the course of inspection of a Boys' School in La Digue where a child was found suffering from the maculo-anaesthetic type of the disease and another a girl aged 12. At the end of the year there were 88 known lepers in the Colony. Attention is called to the fact that more infective cases are segregated at home than on leper islands—this system of home isolation is unsuitable, for the leper patients rarely observe the regulations. The work at the new settlement on Curieuse Island (see this *Bulletin* 1938 Supp. p. 160*) progresses satisfactorily and it is expected that the male section will be ready for occupation in 1938. In course of time all the infective cases will be segregated on this Island. The leprosy clinics at Victoria, South Mahé, Praslin, and La Digue continued to function throughout the year.

Veneral diseases are said to be "extremely prevalent" and responsible for much invalidism—diseases of the circulatory system, many of them of syphilitic origin, and rheumatic affections of gonococcal origin are very common. The true incidence of these diseases cannot be stated owing to the lack of a properly organized system of control. V.D. clinics function at four centres. The 36 in-patient cases treated at the Seychelles Hospital included 19 cases of *syphilis* and 20 of *gonorrhoea* and its complications. Seventeen deaths were registered in the Colony as due to venereal diseases.

With regard to *other diseases* mentioned in the Report it is noted that no case of *smallpox* was reported the regulations governing the compulsory vaccination of children passengers arriving and labourers proceeding to outlying islands continued to be enforced (see this *Bulletin* 1938 Supp p 159*) During the year 781 children were vaccinated. The incidence of *cancer* and other tumours appears high 19 deaths were ascribed to this title in 1937 The returns of the Seychelles Hospital show that 34 patients were treated for *hernias* 34 for *appendicitis* and 65 for *affections of the liver* (including 58 cases of *hepatitis*)

The *Special Annual Medical Reports* of the Assistant Medical Officer South Mahé and of the Assistant Medical Officer Praslin and La Digue are presented as Appendices to the Annual Report under review

Scientific—Routine examinations of specimens of various kinds are carried out in the small laboratory of the Seychelles Hospital The year's work included the application of the Kahn test to 85 samples of serum with positive reactions in 39 cases the examination of 14 samples of sputum, 6 of which were positive with *Afyco tuberculosis* and the examination of 19 smears etc 5 of which contained *Afyco leprae*. A new laboratory building is in course of erection

Financial—Actual expenditure on Medical and Sanitary Services during 1937 amounted to Rs. 90,219

FAR EAST

BRITISH MALAYA.

Introductory—During 1937 a further step towards the compilation of a Pan-Malayan Medical Report was taken (see this *Bulletin* 1938, Supp. p 162*) by the inclusion of certain details relating to the Unfederated Malay States. For purposes of the present *Supplement* and in order to maintain comparisons with previous issues, each of the areas concerned is separately described in the pages which follow. The Report continues the practice of presenting an admirable series of photographs illustrative of various phases of Public Health work in British Malaya.

STRAITS SETTLEMENTS (1937)

The Colony of the Straits Settlements, the collective name given to the Crown Colonies formed by the British possessions on or adjacent to the mainland of the Malay Peninsula, as opposed to the Federated and Unfederated Malay States, consist of the island of Singapore with about a score of small islets lying in its immediate vicinity, the town and territory of Malacca, the island of Penang and Province Wellesley and the island of Labuan. The total area is about 1,357 sq miles (Singapore, 220 sq miles. Penang and Province Wellesley 400 sq miles. Malacca, 640 sq miles) and Labuan, 35 sq miles.

Vital Statistics—The estimated population and its racial and local distribution in the middle of the year under review was as follows—

Race	Singapore	Penang	Province Wellesley	Malacca	Labuan	Total
Europeans	11,640	1,944	309	473	31	14,397
Eurasians	7,591	2,209	289	2,299	44	12,402
Malayans	70,783	40,193	73,614	104,839	3,131	294,565
Chinese	495,854	141,917	52,700	77,479	2,693	770,645
Indians	48,969	31,007	77,355	28,565	149	142,073
Others	8,642	1,781	84	829	63	11,657
Totals	651,486	219,031	154,809	212,232	8,111	1,245,739

Registered births numbered 52,433 and the crude birth rate (all races) was 42.1 per 1,000. *Registered deaths* numbered 27,974 and the crude death rate 22.5 per 1,000. The *Infant Mortality Rate* was 155.8 per 1,000 live births, a decrease of 15.1 by comparison with 1936 experience. The fluctuations in the infant mortality rate are commented upon, and it is pointed out that the highest rates still occur in districts which have a pre-eminently Malay population.

The *Registration of Births and Deaths Ordinance* (1937) which was passed during the year provides for the compulsory registration of stillbirths and for the introduction of changes in method from time to time for the purpose of ensuring the assembly of more accurate data.

Maternity and Child Welfare Work—There are Government maternity hospitals in Singapore and Penang maternity blocks attached to the General Hospitals at Singapore and Malacca and maternity wards or beds are also available at most of the Government District Hospitals in the St. Andrew's Mission Hospital Singapore and in the Kwong Wai Shiu Hospital Singapore—the latter a charitable institution supported by the Chinese community. Plans for an extension of Kangang Kerbau Hospital have been approved and constructional work proceeds.

The Table below summarizes the principal details of maternity work dealt with at various institutions during 1937—

Centre and Institution	Admissions	Deliveries	Maternal Deaths
<i>Singapore—</i>			
General Hospital	583	549	7
Maternity Hospital Kangang Kerbau	5 625	5,214	83
St. Andrew's Mission Hospital	?	489	?
Kwong Wai Shiu Hospital	?	615	?
<i>Penang—</i>			
King Edward VII Maternity Hospital	2,353	2,073	15
District Hospital Province Wellesley	?	275	?
<i>Malacca—</i>			
General Hospital	?	812	?
District Hospitals	?	—	?

Asiatic midwives are attached to many of the smaller district hospitals and every effort is made to persuade Malay women to take advantage of the medical facilities provided. The training of midwives at various centres was continued (see this *Bulletin* 1936 Supp p 161*). Registered midwives in the Colony in 1937 numbered Class A 315 Class B 846 and Class C 321.

Infant and Child Welfare services are provided by the Government in rural districts and by the Municipalities in urban areas. At the 24 Government centres and 9 sub-centres 224,835 visits to homes and 197 418 attendances at clinics were recorded. There are 3 Municipal clinics in Singapore 2 in Penang and 1 in Malacca and these services recorded 202,742 visits to homes and 67 519 attendances at clinics.

In addition to the above there are *Women's and Children's Dispensaries* in the large towns and at these centres the 49 423 new patients treated included 23 617 children.

School Hygiene—The arrangements made for the inspection of schools and school-children have been described in previous issues of this *Supplement*. The following notes briefly summarize the principal items of work carried out in 1937.

Singapore—Visits were paid to English Malay and Chinese schools and 11 477 boys and 8 937 girls were medically examined, 19 per cent of the boys and 67 per cent of the girls examined being referred for treatment. In Boys' Schools 36 per cent and in Girls' Schools 47 per cent of the pupils examined showed dental defects. Enlarged tonsils and adenoids were found in 12.6 per cent of the girls but only 0.9 per

cent. of the boys. Among boys attending Malay Vernacular Schools 52 per cent. of those examined showed infestation with hookworm, but only 8 per cent. of the Malay girls examined were similarly infested. Evidence of gross malnutrition was rare, but less marked deficiency difficult to assess as it does not amount to actual ill-health, was observed in about 10 per cent. of the children examined.

Penang—Pupils examined in *English Boys Schools* numbered 4,757 and of these 59 per cent. showed dental caries, 3.6 per cent. defects of nose throat and ear and 4.1 per cent. skin affections. In *English Girls Schools* 2,328 pupils were examined and results showed 40.4 per cent. with dental caries, 8.8 per cent. with defects of nose, throat, and ear and 5.1 per cent. with skin affections. In *Malay Vernacular Schools* among 3,250 boys and 2,480 girls examined 72 per cent. of the boys and 46.6 per cent. of the girls had dental defects, 7.8 per cent. of the boys and 9.7 per cent. of the girls defects of nose throat, and ear and 6.4 per cent. of the boys and 6.2 per cent. of the girls skin affections. Boys in Malay Vernacular Schools are usually examined for worm infestations. During the year 847 school boys in urban and 1,895 in rural schools were examined. 27.5 per cent. of the former were found to be infested with hookworm and 80 per cent. with roundworm, the corresponding figures for infestations in rural schools being 59 and 76 per cent. respectively. In Malay Girls Schools 91.6 per cent. of the pupils examined were found to have verminous heads.

Province Wellesley—Pupils examined in English and Vernacular Schools numbered 4,157. Of these 34.5 per cent. showed dental defects, 11.6 per cent. skin affections and 8.8 per cent. ear nose and throat defects.

Malacca.—The results of the annual examinations read as follows —

Item	English Schools		Malay Vernacular Schools	
	Boys	Girls	Boys	Girls
Pupils examined	1,639	777	8,709	340
With carious teeth	297	383	3,454	212
Enlarged spleens	16	0	439	0
totals	157	163	1,898	84

Sixty four Chinese schools were also visited and the pupils medically examined but no details are supplied.

Public Health Sanitation, etc—Anti-malarial work undertaken in the various Settlements is described in some detail. Methods of *sewers and refuse disposal* have been described in previous issues of this Supplement (see this *Bulletin* 1937 Supp., p. 167*). In Singapore and Penang sewers are steadily being extended. The need for an efficient and safe manure in rural areas and for more rigorous control of nightsoil and refuse disposal has led to experimental work in methods of disposal by *composting*. The experiment is still in progress.

Water supplies remain for all practical purposes as previously described (see this *Bulletin* 1937 Supp., p. 167* and 1938 Supp. p. 172*). In Province Wellesley constructional work was resumed at

Chero To Kun Dam and a start was also made with the filter station at Bukit Mertajam. In the Northern District a preliminary survey was made by the Public Works Department in connexion with a filtered supply from the Mda River.

Progress is reported in the direction of ensuring that *foods and drinks* shall be prepared and sold under conditions which will reduce the risk of gross contamination and special efforts are directed towards the control of food hawkers. *Housing* in the Municipal area of Singapore is referred to in the summary of the Report of the Municipal Medical Officer of Health.

Regular visits of inspection continue to be made to *estates* by Officers of the Health Branch of the Medical Department. It is said that owners and managers of estates appreciate the advice and recommendations made by visiting officers.

The *training of sanitary personnel* was continued. Ten private and 10 Government students attended the course for the certificate of the Royal Sanitary Institute London. 24 candidates sat for the examination and 15 were successful.

Port Health Work—Quarantine measures were imposed against a number of ports and airports in the Far East for smallpox, cholera and plague. Though no case of *cholera* occurred among the general population there were 38 cases and 16 deaths all imported from infected ports and dealt with at the St. John's Island Quarantine Station. The jurisdiction of the Government Health Department in the *Civil Airport* area was extended to include the sanitary control of aircraft examination of crews and passengers etc. From April to the end of the year 159 aeroplanes with crews numbering 529 and 583 passengers were dealt with. A series of experiments to determine how mosquitoes stand journeys by air were carried out by the Health Officer Karachi in co-operation with the Medical Officer Singapore. *Anopheles Culex* and *Aedes* were used in these experiments. The death rate among the mosquitoes was 4 per cent. and the surviving mosquitoes showed unimpaired activity. Other details of Port Health work can be summarized as follows:—

	Singapore	Penang	Quarantine Stations
Ships examined	823	401	—
Infected ships	0	1	—
Crews examined	103,250	39,212	—
Passengers examined (including immigrants, pilgrims, etc.)	320,584	158,383	—
Rats trapped and examined	1,255	?	—
Rats plague infected	0	?	—
Passengers admitted	—	—	71,505
Total sick treated	—	—	1,219
Total deaths	—	—	58
Cases of cholera	—	—	13
Cases of smallpox	—	—	2

Hospitals Dispensaries etc—The following Table briefly summarizes the volume of work dealt with at various institutions (exclusive of Leper Settlements) maintained by the Medical Department:—

Item	In-patients		Out patients
	Treated	Died	
Singapore—			
8 Hospitals	38,011	3,940	33,779
Dispensaries	—	—	39,420
Travelling Dispensaries	—	—	20,491
Penang & Province Wellesley—			
8 Hospitals	22,920	1,543	51,766
Dispensaries	—	—	28,238
Travelling Dispensaries	—	—	42,900
Malacca—			
2 Hospitals	10,120	772	15,432
Dispensaries	—	—	25,170
Travelling Dispensaries	—	—	19,515
Labuan—			
1 Hospital	268	13	1,333
Travelling Dispensaries	—	—	1,490

According to the above figures 71,319 in patients were treated in all hospitals and 6,268 died in another place it is stated that hospital admissions numbered 73,884 and hospital deaths 6,708. The out-patient figures do not include patients treated in special clinics, Infant Welfare Centres, school-children, etc.

Sections of the Report under review briefly comment upon the work of such specialist services as *Ophthalmology Radiology Dental Surgery* etc.

The incidence of malaria can only be guessed at by reference to the recorded hospital cases, and these facts as given are unsatisfactory. In one place the number of patients admitted to Government hospitals and diagnosed malaria is given as 8,625 in another place it is said the total classified cases (malaria) was 6,375 and yet in the classified Hospital Returns admissions for malaria total 8,638 distributed as to *benign tertian* 1,839 *quartan* 193 *subtertian* 4,120 *blackwater fever* 3 mixed and other infections 557 and unclassified 1,828. One table shows 298 hospital deaths due to malaria (includes 1 due to *blackwater fever*) and another 292 deaths.

Deaths due to malaria in the Straits Settlements as a whole numbered 1,185.

The Fourth International Course in Malarology was held at the King Edward VII College of Medicine Singapore, and attended by 17 graduates from seven countries. The general arrangements were similar to those in previous years but there was in 1937 closer collaboration between field and laboratory work, and more time devoted to field surveys. Following completion of the Singapore part of the Course practical field studies were continued in Malaya, Java, and Indo-China.

No case of *cholera* or *plague* occurred among the general population. 38 imported cases of *cholera* were dealt with at the Quarantine Stations. An outbreak of *smallpox* in Kedah was reported one concealed case was discovered and 3 contacts developed the disease. There were no deaths. Government Health Department Officers performed 127,457

vaccinations 96,331 were done in the Penang area following the outbreak in Kedah. Thirty five cases of *tropical typhus* (includes 2 cases of Japanese River Fever) were dealt with in hospitals two of the cases terminated fatally. According to Hospital Returns 20 patients were admitted suffering from *cerebrospinal meningitis* and 7 of them died. 14 deaths were ascribed to this disease in the Straits Settlements as a whole.

Food sold by the numerous itinerant hawkers continues to be a common cause of infections of the *enterica* group of fevers (see this *Bulletin* 1938 Supp. p. 174*). During the year 371 in-patient cases of *typhoid* with 81 deaths and 14 of *paratyphoid fever* with 1 death were dealt with. In the Straits Settlements as a whole 110 deaths were registered as due to enteric fever. At the Laboratory 1,393 samples of blood serum were received for agglutination tests and the following positive results recorded: *Bact. typhosum* 393 *Bact. paratyphosum* A 16 B 12, and C 7. *Bact. typhosum* was isolated from specimens of urine on 39 occasions and positive clot cultures of this organism were obtained from 152 specimens of the samples of blood serum examined.

Of the 688 cases of *dysentery* treated in hospitals with 161 deaths 313 were amoebic (46 deaths) 287 bacillary (96 deaths) 8 were mixed infections (7 deaths) and 80 were undefined (12 deaths). Deaths in the Colony as a whole due to *dysentery* numbered 275 and in addition 1,373 deaths were ascribed to *diarrhoea and enteritis*. Hospital cases of *diarrhoea and enteritis* totalled 1,727 with 476 deaths and of these 734 of the cases and 390 of the deaths relate to children under two years of age. From the examination of 2,724 faecal specimens at the Laboratory the following organisms were isolated: *Bact. dysenteriae* Flexner 213 Schmitz 11 Shiga 10 Sonne 4.

Tuberculosis continues to be one of the most important causes of death and disablement in the Straits Settlements. *Pulmonary tuberculosis* was the registered cause of 2,268 deaths and other forms of tuberculosis caused 196 deaths. Of the total deaths due to tuberculosis (all forms) in the Colony 1,475 occurred in the Municipal area of Singapore. The treatment of the disease in Government hospitals continues as in former years. It is said that more patients are presenting themselves for treatment at a comparatively early stage of the disease (see this *Bulletin* 1938 Supp. p. 174*). Hospital cases of tuberculosis (all forms) numbered 2,691 with 992 deaths and of these 2,649 of the cases and 879 of the deaths were due to the *pulmonary* form of the disease. There were 2,048 cases of *pneumonia* (all forms) treated in hospitals with 1,182 deaths and 1,438 cases of *bronchitis* with 29 deaths.

As has been observed in previous years the incidence of *beriberi* is closely related to the general prosperity of the Colony—with incidence higher as a rule during good years (see this *Bulletin* 1938 Supp. p. 175*). During the year under review 1,385 in-patient cases were dealt with in the various Colony hospitals and 237 of these patients died.

Leprosy.—Although during the year under review there was a decrease in the number of patients seeking admission to the Leper Settlements in the Colony the problem of accommodation continues to give rise to concern. From the special section of the Report dealing with the activities at the various Settlements the following details have been extracted:—

Item	Lepet Settlements	
	Singapore	Pulau Jerejak, Penang
Patients admitted 1937	193	234
treated	417	1 431
discharged	7	1*
reconded	36	?
died	8	151
transferred	134	—
remaining at end of year	23*	1,205

Of the 1,205 patients at the Pulau Jerejak Settlement 896 were Chinese and 188 Indians (see this *Bulletin* 1938 Supp. p. 174*)

Veneral Diseases.—The majority of cases of venereal disease are treated in the special out patient clinics which are under the control of the Chief Medical Officer Social Hygiene (see this *Bulletin* 1938, Supp. p. 175*) but a considerable number of patients are admitted to and treated in hospitals the following figures relate to in-patients only —

	Syphilis	Gonorrhoea	Soft Chancres	Tropical Bubo	Other V.D.
Cases.	1 305	821	419	180	250

Out-patients (new cases) applying for treatment at the special clinics numbered 22,814 and of these 6 155 were suffering from syphilis, 4 432 chancroid and 6 027 gonorrhoea. During recent years there has been an increase in the number of patients treated for soft chancre and gonorrhoea, and a decrease in the cases of syphilis. A very considerable disproportion is observed between the numbers of males and females treated, e.g. syphilis males 5,382, females 773 soft chancres males 4 424 females 8 gonorrhoea males 5 729 females 298.

At the Special Clinic provided for the treatment of seamen 1 099 seamen were treated of these 493 were Chinese 357 British, and 161 non British Europeans.

It is said that recorded cases at the various treatment centres are not necessarily a true indication of the incidence of venereal diseases in the Colony members of the naval and military forces when infected are treated by their own medical services, and among the general population a considerable number of patients will be treated by private practitioners, and by "Eastern methods," etc.

Among other diseases the following appear worthy of mention. An appreciable increase in the hospital admissions for cancer is noted—684 cases with 247 deaths. *Helminthic diseases* are not mentioned in the text of the Report, but Hospital Returns supply the following facts relating to in-patient cases *ankylostomiasis* 1 632 cases with 13 deaths *ascariasis* 613 cases with 19 deaths *dracontiasis* 13 cases with 1 death other helminths 38 cases.

Other references in the Hospital Returns include 1 910 cases of *influenza* with 20 deaths 840 cases of *nephritis* with 206 deaths, and *hernias* were responsible for 357 cases and 31 deaths. The increase in mechanized traffic is reflected in the 882 admissions to hospitals due to motor accidents and 75 deaths.

Scientific—The year's work at the *King Edward VII College of Medicine* Singapore is described as usual and in some detail. Twenty-four medical and 12 dental students were admitted during 1937 18 medical and 4 dental students passed their final examinations and at the end of the year there were 106 medical and 61 dental students on the books of the College.

Research activities have always figured prominently in the work of the different Departments of the College and included the following studies during 1937. In the Department of Biochemistry research work in local foodstuffs was continued (see this *Bulletin* 1937 Supp p 170* and 1938 Supp p 176*) while the Department of Bacteriology devoted attention to various aspects of the *juncus* problem. The patients admitted to the Tan Tock Seng Hospital are providing opportunities for the study of differences in diet and of deficiency disorders among the various peoples of Malaya. It had been noted that many patients are admitted suffering from a deficiency disease alone many others from diseases in which a deficient diet is an important contributory factor that macrocytic nutritional anaemias are almost exclusively seen amongst Indians and that what is believed to be a deficiency disease affecting the sensory side of the nervous system (in contrast to dry beriberi which mainly affects the motor system) is met with among Chinese patients. These matters are under investigation. Scientific papers published by members of the staff included the following—

FELL (W. A.) Development of the skull of *Ornithorhynchus*—*Trans Zool Soc* Part I 1936

and the following articles published in various issues of the *Journal of the Malayan Branch of the British Medical Association*—

CALDWELL (A. F.) The Chemistry and Preparation of Pyrethrum Spray
OLIVEIRO (C. J.) Basal Metabolism in Singapore.

— A Survey of Singapore Children in regard to their weight, height, and nutrition

SMITH (C. E.) The Histidine Treatment of Gastric Ulcer

— The Synthesis of Hippuric Acid as a Liver Efficiency Test.

HARIDAS (G.) Infantile Beriberi.

— Liver Efficiency Tests.

— Tuberculosis in Infants and Children.

MONTEIRO (E. S.) A Case of Gout.

— A Case of Lathyrism.

— Some Observations on the Action of Kadal Ranji in Diabetes Mellitus.

PALLISTER (R. A.) Some Observations on Pulmonary Tuberculosis in Singapore.

HAWES (R. B.) MONTEIRO (E. S.) & SMITH (C. E.) The Treatment of Acute Beriberi or 'Shoshin' with massive doses of Vitamin B

The Report of the Pathological Branch describes the year's work at the laboratories established in Singapore Penang and Malacca the principal items of routine work may be summarized as follows—

	Singapore	Penang	Malacca
Serological tests for syphilis	15 181	8 461	4,332
Cultural examinations	4,333	3 427	1,203
Angiostriation tests	2 064	373	684
Histological sections examined	3 163	180	83
Autopsies	1,587	180	119

Financial—Expenditure on Medical and Health Services in each of the Settlements and in the whole Colony was as follows —

Singapore	\$2 139,240
Penang	1,066 063
Malacca	393 007
Labuan	22 747
Total	\$3,628 059

Penang, Straits Settlements.

MUNICIPAL HEALTH OFFICER'S REPORT ON THE HEALTH OF THE MUNICIPALITY OF GEORGETOWN PENANG 1937

Statistical Statistics—The relevant facts may be tabulated as follows —

Race	Estimated Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
European	1 325	56	42.3	6	4.5	—	—
European	1,330	50	22.4	26	11.6	—	—
Chinese	114,292	4,547	39.8	324	29.2	607	133
Malay	1,602	490	32.7	386	17.9	71	145
Indian	27,230	732	28.0	445	16.3	86	113
Others	1 968	34	17.1	21	10.8	4	118
Totals	168,667	5,839	35.0	3,205	19.0	768	129

The above facts are presented in considerable detail in the Report under review. The gross total of deaths within Municipal limits during the year was 3 697 but of these 489 were *non-residents*. Intestinal diseases, respiratory diseases, prematurity and convulsions were responsible for 580 of the 786 infant deaths recorded, while of the total deaths in this group 30.9 per cent occurred within the first month of life and 40 per cent between three months and one year.

Maternity and Child Welfare Work continued at the two Clinics, Kimberley Street and Coombe Lines Road (see this *Bulletin* 1938, Supp. p. 177*) and details of the volume of work include the following—First attendances, Kimberley Street 1 775 re-attendances 6 590 Coombe Lines first attendances 671 re-attendances 2,057 these details are classified by race and disease incidence among patients.

At the Kimberley Street Clinic 149 women attended for ante-natal advice and supervision and the corresponding number at the Coolie Lines Road centre was 76. Infant work continued with success at both centres. As in former years District Visiting was carried out by two Health Sisters assisted by locally qualified midwives and during the course of this work 59 651 visits were paid. Midwives registered under the Midwives Ordinance were Class A 90 Class B 295 and Class C 10. The chief causes of infant mortality were referred to in the section *Infant Statistics* above. It remains to say that following an investigation of infant mortality it was noted that such deaths were more numerous in congested areas of the Municipality and that in some cases it would appear that the teaching of Health Visitors is disregarded when such visits cease when infants are three months old. Extension of the district work is recommended.

Public Health Sanitation etc.—There is nothing new to add to former accounts of the services concerned with the collection and disposal of *night soil and refuse* (see this *Bulletin* 1936 Supp. p. 169* 1937 Supp. pp. 172*-173* and 1938 Supp. p. 178*). *Water supplies* throughout the year are said to have been ample and of good quality.

The Chief Sanitary Inspector contributes his Annual Report of the work of his Department (see this *Bulletin* 1938 Supp. p. 178*).

No description of *Hospitals or Dispensaries* within the boundaries of the Municipality is supplied but the facts concerned with *morbidity experience* are tabulated in some detail the principal of these are summarized hereafter.

Twenty six deaths were ascribed to *malaria*. All were investigated with a view to the discovery of the probable origin of infection. Of 2 cases within the Municipality 1 was diagnosed clinically or on hearsay evidence of relatives just prior to death and of 6 described as unknown who died in hospital no information was available. It is said the numbers of malaria-carrying mosquitoes continues to decrease. But though only 6 deaths were ascribed to malaria no less than 458 appear in the Returns as due to *Unspecified Fever* 288 of these occurring among the Chinese members of the community.

The notified cases of the *principal infectious diseases* include tuberculosis 312 chickenpox 176 enteric fever 88 measles 34 diphtheria 29 puerperal fever 16 influenza 13 erysipelas 6 and cerebrospinal meningitis 2.

Of the 88 cases of *enteric fever* notified 60 were treated in hospital with 14 deaths, and among the remaining 28 cases 10 died. The distribution of the disease is general throughout the Municipality and the number of cases has shown a tendency to increase year by year. In the course of his discussion of probable sources of infection Dr W. H. BRODIE observes that one source which has not been effectively dealt with is the street hawker of foods and drinks. The rigorous licensing of this class of street trader would help to solve the problem. Thirty deaths were ascribed to *dysentery* 102 to *diarrhoea* and 81 to *enteritis* but no comment on any of these causes is supplied. It is noted that 96 per cent. of the deaths due to enteric fever 89 per cent. of those due to enteritis 80 per cent. of the dysentery deaths and 78 per cent. of the deaths ascribed to diarrhoea occurred among the Chinese.

Tuberculosis as a cause of death is only exceeded by the title "Unspecified fever" for during the year under review all forms of tuberculosis caused the deaths of 312 persons and of this total 293 were due to the *pulmonary* form of the disease. *Pneumonia* was the cause of death in 166 cases, *bronchitis* in 137 while *other respiratory diseases* were responsible for 274 deaths.

Fifty-six deaths were due to *beriberi* and of these 51 occurred among the Chinese while of the 26 cases of *puerperal fever* notified, 13 terminated fatally.

No mention of *venereal diseases* is made, though it is noted that 21 deaths were due to *syphilis*. No case of *plague* or *smallpox* occurred. The rat-catching gang continued their activities and were successful in destroying 7,342 rats. Within the Municipal limits practically all vaccinations are carried out by the house-to-house visits of whole-time vaccinators who during the year performed 4 153 primary and 223 secondary vaccinations private practitioners performed 563 primary vaccinations.

Financial—The total expenditure on Municipal Medical Services during 1937 amounted to \$171 091 or deducting revenue \$158,552.

Municipality of Singapore (1937)

Vital Statistics—In the previous issue of this *Supplement* an account was given of the peculiar difficulties encountered when attempting to estimate the intercensal population of Singapore, the methods of calculation employed in the past, and the reasons leading up to the adoption of the *Wieland* method in 1936 (see this *Bulletin* 1938 Supp. p. 180*). In the Report under review Dr P. S. HUTTON, Municipal Health Officer again refers to this estimation problem, adheres to the *Wieland* method in preparing the estimate for 1937 and explains that the method has been applied to Chinese, Malays, and Indians only since the numbers for other nationalities are so small that indices would be unreliable. The problem of estimation was further complicated in 1937 for with the outbreak of hostilities in China there followed a big influx of Chinese official figures show an excess of Chinese arrivals over departures in Malaya of 158,803 and no doubt many remained in Singapore—according to some estimates 70 000 Chinese refugees took up their abode in the Municipality. The relevant vital statistical facts for 1937 read as follows—

Race	Estimated Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I M R.
Europeans	8 478	248	28.9	47	5.5	3	12.2
Europeans	7 248	191	26.4	90	12.4	21	109.9
Chinese	398 873	18,577	46.6	9 455	23.7	3,203	172.4
Malay	50 365	1 982	38.9	1 154	22.9	451	229.9
Indians	46,533	1 355	28.9	83*	17.8	189	130.3
Others	8 367	291	34.8	106	12.9	21	72.7
Totals	520 164	22,621	43.5	11,686	22.5	3,688	171.9

The *mortality statistics* in this Report are presented in considerable detail as to causes of death for the various nationalities in conjunction with sex in fifteen age groups. Other tabular statements show the seasonal distribution of births and deaths.

Maternity and Child Welfare Work—Dr Muriel CLARK, Lady Medical Officer continues to contribute her admirable annual account of the work carried out in the supervision of Midwives and Infant Welfare Department. During the year 18 567 new babies were entered in the Clinic Registers—this figure presents 82.1 per cent. of the total annual births registered in the Municipality. Clinic consultation figures increased from 46,888 in 1936 to 50 623 in 1937—a striking testimony to the steadily increasing confidence of mothers in the work of the Clinics and of their growing tendency to seek advice and treatment. District Sisters and Staff Nurses paid 27 999 visits to the homes of patients and of this total 18 347 were first visits to newly confined or sick mothers—this increased volume of work was made possible by an additional appointment to the staff and the reorganization of the work into five districts in place of four as formerly. Health visitors also paid 114 700 home visits to patients during the year while Municipal midwives attended 1 654 confinements of poor mothers.

Dr Muriel Clark has much to say of the great prevalence of *avitaminosis* both in infants and mothers observing that *beriberi* continues to be a positive menace to the mothers and babies and cases are seen by us in ever increasing numbers. Provision has been made in the 1938 Budget for the allocation of funds for specialized work in connexion with syphilis and beriberi among mothers and babies attending the ante-natal clinics (see this *Bulletin* 1938 Supp. p. 181*). During the year 19 cases of *puerperal sepsis* were reported—all cases were carefully investigated but in none was the midwife the carrier of the infection. Fewer cases of *icterus neonatorum* were reported—in the 68 cases recorded and investigated it was found that in every case there had been no skilled attention at confinement.

Public Health Sanitation etc—The Department undertook and carried through successfully a considerable programme of works concerned with *malaria control*. These activities are described in great detail in a special section of the Report by Dr N. A. CANTON, Deputy Health Officer.

The whole of the *sewage* with the exception of that treated in house installations is dealt with at the Alexandra Road Disposal Works (see also this *Bulletin* 1937 Supp. p. 175* and 1938 Supp. p. 181*). Since the beginning of June 1937 all *night soil* has been collected at two stations and pumped through a pipe-line to the Disposal Works for separate treatment by a digestion process. Tabular statements are presented giving the averages and ranges of daily analyses of crude sewage and effluents from the Disposal Works. The sources of supply of *raw water* are the impounding reservoirs on Singapore Island and in Johore—the characters of the raw waters from these sources are very similar. Methods of treatment remain for all practical purposes unchanged (see this *Bulletin* 1935 Supp. pp. 168*–169*) and samples drawn from every part of the purification system are analysed daily—the results of these analyses are reproduced in a series of Tables in the Report under review.

With regard to housing Dr Hunter observes that "the greatest problem facing Singapore to-day is still insanitary housing specifically and an acute housing shortage generally" and proceeds to discuss the situation at some length. The *Improvement Trust* which was the direct result of the recommendations of the Housing Commission of 1918 is sadly hampered by the limitations of the objects on which its available funds may be expended, and by an Ordinance that has been legally assailed with success on almost every section of consequence. Dr Hunter urges that if the Trust or other responsible body cannot be given wider powers and the finance to undertake new housing on a more extensive scale and the Municipal Ordinance amended to ensure that all new buildings shall conform to prescribed sanitary standards, the need for a new Housing Commission is urgent.

The *Inspector of Foods and Markets* contributes his usual Annual Report on the Municipal Markets and the inspection of foodstuffs sold in them and in the town generally. This Report describes the year's work in great detail (see this *Bulletin* 1938 Supp. p. 181*). In another section the Municipal Analyst deals with the examination and findings recorded of 2,162 samples submitted by the Health Department of the total 1,014 samples were examined in connexion with the sale of *Food and Drugs Ordinance* and of these 460 were samples of milk and milk products.

Hospitals, Dispensaries, etc.—In the Annual Report of Dr C. C. B. Gilmour, Medical Superintendent of the Middleton Hospital, it is stated that during the year under review 1,324 patients were admitted, 1,360 treated, 1,246 were discharged, and 61 died. The diseases responsible for the majority of admissions were *chickenpox* 709 cases, *mumps* 206 and *dysentery* 170. As regards the nationalities of patients admitted, 820 were Indians, 344 Chinese, 67 Europeans and 85 Malays. 287 of these were Municipal employees and 1,174 school-children.

The records of morbidity experiences *etc.* 1937 contain no particularly outstanding feature. The year was free from the three dangerous infectious diseases, *smallpox*, *cholera* and *plague*. During the year 18,999 vaccinations were performed and of these 15,881 were done by Municipal Vaccinators. Routine rat trapping was carried out continuously. 3,381 rats were destroyed and examined at the Bacteriological Laboratory but none was found to be infected with *P. pestis*. The flea index per live rat was 1.81 and in this connexion it is observed that this so far unexplained scarcity of insect life on our local rat constitutes the greatest single protective factor in our freedom from *plague*.

Of the 217 cases of *dysentery* reported 207 were admitted to Hospital and 42 died. Total deaths ascribed to this disease 57. It is believed that many more cases occurred than were notified, for the affection is regarded lightly, especially by lower class Chinese parents (see this *Bulletin* 1938 Supp. p. 182*). Dr Gilmour of the Middleton Hospital is of the opinion that the immunization of all infants should be seriously considered, and that this could be carried out by the Infant Welfare Branch just when the infants are coming off the register at the end of the first year of life. An attempt on a small scale is being tried to discover the reaction of parents towards the operation. At the Laboratory, *C. dysenteriae* was isolated in 461 out of 2,235 specimens examined.

Tuberculosis has been deleted from the list of notifiable diseases—this action having been taken without any consultation with the Medical Department. Despite the lack of facilities for dealing adequately with cases of the disease it is felt that the disinfection of houses and cubicles which followed notification was of some value in that it served to impress the public with the knowledge that tuberculosis was an infectious disease. No cases were admitted to the Middleton Hospital but total deaths due to this cause in the Municipality were distributed as follows —

Nationality	Deaths due to Tuberculosis		
	Respiratory	Other Forms	All Forms
Europeans	1	2	3
Eurasians	15	—	15
Chinese	1 085	152	1,237
Malaya	104	7	111
Indians	82	11	93
Others	15	1	16
Totals	1,302	173	1 475

Bronchitis caused the deaths of 244 people *broncho-pneumonia* 1 202 and *pneumonia* 542 during the year under review

Notifications of *enteric fever* totalled 227 five of these related to paratyphoid fever. Seventy three deaths were ascribed to *typhoid* and 1 to paratyphoid fever. Dr Hunter again comments upon the insanitary activities of the itinerant hawker who is responsible for a large share of this preventable disease, and observes of the contemplated new Food and Drugs Regulations designed to tighten up control of the peripatetic food hawker. These regulations are still on the stocks! As regards the mortality due to *dysentery* the following details are taken from tabulated returns —

Nationality	Deaths due to Dysentery			
	Amoebic	Bacillary	Unspecified	Total
Europeans	—	—	—	—
Eurasians	1	1	—	2
Chinese	55	40	77	172
Malaya	—	—	10	10
Indians	3	4	5	12
Others	4	—	—	4
Totals	63	45	92	200

Anti mosquito work is discussed at some length (see *Public Health* above) but there is no specific mention of the incidence of *malaria* though mortality returns ascribe 428 deaths to this cause. At the Bacteriological Laboratory where 5,925 blood films were examined 11.2 per cent were positive with *malaria* parasites the distribution of types of infection being *benign tertian* 392 *subtertian* 268 *mixed* infections 5 and *quartan* 1. Eight cases of *typhus fever* were notified

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hospitals exclusively reserved for female patients. The Report under review observes "The number of maternity cases admitted to Government hospitals was 7,522" but according to the Hospital Returns there were 7,793 cases of normal labour, 364 abnormal labour cases, a further 72 other cases associated with childbirth, and a large number of other cases included in the group *Conditions arising in Pregnancy etc.* At the Chinese Maternity Hospitals at Kuala Lumpur, Ipoh and Seremban 7,036 deliveries were recorded during the year. Particulars are not available for the Chinese maternity hospitals in the smaller towns.

The training of midwives in Government and Chinese Hospitals was continued as previously described (see this *Bulletin* 1933 Supp. p. 163*).

Infant Welfare Work continues to expand: there are 5 centres in Perak, 5 in Selangor (the 1933 Report said 9), 1 in Negri Sembilan and 1 in Pahang. Midwives practising in the towns are registered and supervised from these centres. *District visiting* has become a prominent feature of ante-natal and infant welfare work in all areas.

School Hygiene—Regular inspections of school premises and examinations of school-children continued to be carried out. During the year 58,920 children were medically examined and the following defects (in percentages) for each State recorded—

Item	Perak	Selangor	Negri Sembilan	Pahang
Dental defects	25.7	29.7	66.6	50.0
Skin diseases	4.0	8.8	7.2	6.9
Eye defects	0.7	0.9	4.4	0.3
Enlarged spleens	6.3	15.0	12.4	8.9
Pediculosis	— 0	4.7	15.8	0.3

The Dental Surgeon, Selangor, continued to visit the neighbouring States of Negri Sembilan and Pahang; a Dental Surgeon was appointed for work in Perak, and a Lady Medical and Dental Officer in Klang undertook the dental care of school-children in the coastal district of Selangor.

Public Health Sanitation etc.—Though by comparison with 1936 experience the crude death rate in 1937 rose only by 0.7 to 19.9 per mille, the Report observes that the public health "was not as satisfactory as in previous years." The mortality rate showed no striking change but the numbers of in-patients treated in Government Hospitals showed an increase of over 17 per cent. The passing of the *Anti-malaria Enactment* during the year empowers the Health Authority to issue orders for dealing with mosquito breeding places in any area.

There is little to add to previous descriptions of methods of *sewage and refuse disposal* except to say that in rural areas bored-hole latrines are increasing in number in villages and on estates. *Water supplies* are generally satisfactory. Village supplies are being improved: two purification plants have been erected in Perak, and in the lower reaches of the Perak River tanks are filled once a week with purified water conveyed by water-boat. The demolition of *insanitary houses and slums* continued to be systematically carried out in the large towns.

plans for new buildings must be approved by the Town Planning Committees and Health Officers in the various district areas.

Estates and Mines continued to be regularly visited by Health Officers. On estates progress is reported in the housing of labourers, provision of water supplies and general sanitation. Many of the larger estates have their own visiting medical practitioners but on the mines it is said that the supervision of health and sanitation is not so thorough and on the smaller mines in particular health supervision is difficult. Labourers employed by Government Departments receive the attention of Officers of the Health Branch while *Railway Sanitation* is dealt with by the Railway Health Officer (seconded from the Malayan Medical Service) and his staff.

The manufacture and sale of *foods and drinks* was closely supervised by the Health Department and Sanitary Board staffs. The usual measures were taken to spread *knowledge of hygiene and sanitation* special attention being devoted to kampong communities.

The training of Sanitary Personnel was continued. Probationer Sanitary Inspectors receive preliminary instruction from Health Officers and special facilities are provided in Singapore for candidates wishing to sit for the certificate of the Royal Sanitary Institute London.

Port Health Work—During the year 2 188 ocean-going vessels entered and cleared Port Swettenham and in addition clearances of local vessels (exclusive of native craft) numbered 728. The Port Health Authorities dealt with 137 763 passengers and 99 028 members of ships crews. 49 vessels arrived from infected ports and 55 645 immigrants and deck passengers were admitted to the Quarantine Station where they were examined for signs of leprosy, evidence of recent vaccination, helminthic infections, etc. 187 cases of leprosy were discovered and these were repatriated, 11 064 persons were vaccinated, more than half the immigrants were found to be infected with worms and anthelmintic treatment was given to all. To the Quarantine Hospitals 1 090 patients were admitted and 38 died.

Hospitals Dispensaries—The number of in patients dealt with at the various hospitals shows a large increase over the records for the preceding year. the relevant hospital data are as follows—

State	Hospitals	Beds	Admissions	Deaths	Out patients
Perak	18	2,418	50,893	3 874	104 404
Selangor	7	1 470	29 194	2,249	75 343
Negeri Sembilan	6	878	18,815	1,385	56 040
Pahang	8	661	16,996	988	73 837
Totals	37	5,527	115 893	8 494	309 624

Of the 115,893 in patients mentioned above 41,316 were Chinese 61 262 Indians 10 791 Malays and 2,529 Others.

[Three different statements of hospital admissions and deaths appear in the Report. one says 116 712 admissions with 8 469 deaths, the next 115 893 and 8 494 deaths and the third 121 929 admissions with 8 497 deaths.]

(1937)

In addition to the out patients treated at hospitals a large number were treated at stationary and travelling dispensaries, the numbers so dealt with exclusive of those treated at Infant Welfare Centres special clinics etc., were as follows —

Treatment Unit	Perak	Selangor	Negeri Sembilan	Pahang
Sanitary Dispensaries	86,416	107,365	23,092	11,680
Travelling Dispensaries	—	54,684	31,814	—
Road	69,785	—	—	30,331
River	12,661	—	—	970

Sections of the Report under review briefly comment upon the work of such specialist services as *Ophthalmology Radiology Dental Surgery* etc.

The prevailing diseases among hospital in-patients were *malaria respiratory ailments venereal diseases and intestinal affections* some of these causes are briefly referred to in the notes which follow.

A somewhat serious increase in *malaria* incidence was a feature of 1937 health experience and it is said "over 35 000 cases were admitted to hospitals (Hospital Returns show 24 778 and in addition 15,225 patients were treated in Estate Hospitals) and the Malaria Advisory Board's "Index of Malaria" which represents incidence in 1933 as 100 was 154 in 1937. The distribution of types of infection among 24 778 hospital in-patients was *benign tertian* 8 040 *quartan* 381 *subtertian* 12,715 *malarial cachexia* 2,131 *mixed infections* 714 *unclassified* 2,772, and *blackwater fever* 23.

In the Federated Malay States as a whole 1 144 deaths were registered as due to *malaria* but no less than 13 030 deaths were ascribed to *Fever of undefined origin*.

Meteorological conditions undoubtedly were responsible for some part of the increase of *malaria* but other factors were (a) the arrival of large numbers of non-immune labourers for work on mines and estates, and (b) the creation of new mosquito breeding places consequent upon replanting activities on rubber estates.

At Hospital Laboratories in the four States 296,235 blood films from 150,373 patients were examined for the presence of *malaria* parasites positive findings were, *subtertian* 17,305 *benign tertian* 11,509 *quartan* 862, and *mixed infections* 1 107. The Malaria Research Division continued the investigation into the relative therapeutic values of *atebrin totaquina, quinine* and certain proprietary remedies.

The dangerous infectious diseases mentioned in the Report and treated in hospitals include 208 cases of *diphtheria* with 62 deaths (294 notifications and 72 deaths in the four States) 211 cases of *tropical typhus* causing 16 deaths—under this title are included 122 cases of Japanese River Fever and 7 deaths. 13 cases of *cerebrospinal meningitis* with 12 deaths 10 cases of *acute poliomyelitis* with 3 deaths, and 183 cases of *tetanus* with 148 deaths. with regard to the latter title it may be noted that no fewer than 113 of the cases and 101 of the deaths are referable to newly-born children.

The numbers of admissions to hospitals and deaths in the four States due to *enteric fever* have steadily increased during the past four

years Of the 336 hospital cases resulting in 69 deaths 330 of the cases and 68 of the deaths were *Bact typhosum* and the remainder *Bact paratyphosum* infections *Dysentery* and *diarrhoea* also cause a progressively increasing number of cases and deaths each year without any apparent explanation to account for these increases though possibly the arrival of new immigrants from India may be an important factor During the year under review hospital in patients treated for *dysentery* numbered 1,537 distributed as to 900 *amoebic* 385 *bacillary* and 252 undefined cases there were 186 deaths In patients suffering from *diarrhoea* and *enteritis* totalled 2 566 and 584 died 912 of the cases and 400 of the deaths occurred among children under two years of age At the Hospital Laboratories where the stools of 120,842 patients were examined 1 135 specimens were positive with *E histolytica*

Deaths from *beriberi* in the four States numbered 319 and of these 131 occurred in Selangor Hospital in patients treated for this cause numbered 584 and 59 of them died It is now being recognized that *beriberi* exists amongst the Malay population to a greater extent than has hitherto been realized in areas where rice is not grown

In the Federated Malay States as a whole 1 413 deaths were ascribed to *tuberculosis* (all forms) Patients suffering from various forms of the disease and treated in hospitals numbered 2,317 and 897 died while of these 1 994 of the cases and 791 of the deaths were due to the *pulmonary* form of the disease The disease is most prevalent among the Chinese An investigation of the tuberculin reaction of school-children has been commenced *Pneumonia* is another cause responsible for considerable sickness and mortality 3 624 in patients were treated and 1 707 died There were also 3,924 cases of *bronchitis* with 120 deaths A year ago it was observed that *helminthic diseases* were a serious cause of disability During the year under review 1 407 in patients were treated for *ascariasis* 926 for *ankylostomiasis* 23 for *filariasis* 11 for *dracontiasis* and 74 for other helminthic infections. At the Hospital Laboratories where 189 148 examinations of faecal specimens were carried out 29,384 were positive for *Ascaris* and 11,271 for *ankylostome* ova.

Leprosy is discussed at some length in a special section of the Report To the Sungai Buloh Settlement there were 430 new admissions 221 re admissions 214 patients absconded 134 were discharged and 121 died, leaving at the end of the year 1 937 patients in residence Of the 1937 inmates 1 409 were men 382 were women and 146 were children while the racial distribution reads Chinese 1 459 Indians 326 Malays 139 and Others 13 The old Leper Asylum Kuala Lumpur accommodates a diminishing number of chronic incurable lepers who are opium smokers at the end of the year there were 183 of these The unsatisfactory classification of *leprosy* into cutaneous and neural provoked a good deal of research work in connexion with the recognition of the intermediate types and it has been established that there is an insensible gradation between tuberculoid and cutaneous *leprosy* A new and interesting type which appears to be unknown elsewhere is described as acute ulcerative tuberculoid *leprosy* In view of the absence of any standard description of the treatment of tuberculoid *leprosy* experiments were undertaken during the year with the object of discovering what specific treatment would prove of

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most value the most satisfactory results were obtained by subcutaneous injections of hydnocarpus oil twice a week, in doses equivalent to 1 cc. per 10 lbs. of body weight.

During the year several members of the Health Department Staff attended a course in the early diagnosis of leprosy at the Sungai Buloh Settlement.

There was a further increase in the number of cases of venereal diseases treated in hospitals. The figures for in-patients only totalled 4,935 and these included 1,628 cases of syphilis, 2,221 of gonorrhoeal infections, 851 of soft chancres and 218 of tropical bubo. In another section of the Report under the heading "Social Hygiene" the following details are supplied of new cases treated at hospitals and clinics during 1937 —

Race	Syphilis	Gonorrhoea	Soft Chancres	Totals
Chinese	4,819	3,058	846	8,723
Tamils	2,899	2,372	1,031	6,212
Malays	1,477	946	114	2,537
Sikhs	363	327	103	793
Erramans	45	51	21	115
Europeans	9	59	9	77
Others	221	153	23	396
Totals	9,741	6,965	2,147	18,853

To the Central Mental Hospital the number of admissions during the year—1,225—established a record. The rapid increases in the numbers of admissions to this institution in recent years is described as alarming. Considerably fewer patients were discharged during the year 750 as compared with 863 in 1936 and at the end of the year there were 2,882 patients in the hospital.

Other diseases mentioned include the following. No case of *Plague* or *Cholera* has been reported since 1923. During the year under review no case of *smallpox* was notified. Routine vaccination work was continued and 108,285 vaccinations performed. The incidence of *anaemia* again showed an increase with 2,019 in-patient cases and 311 deaths. 1,328 of the cases and 200 of the deaths were due to secondary anaemia characterizing the terminal stages of such diseases as malaria and *ankylostomiasis*. For *ulcers* 2,973 patients were treated.

Scientific—The results of routine examinations carried out at the Hospital Laboratories have been the subject of brief mention in the preceding notes. At the *Institute for Medical Research* periods of considerable pressure characterized the work of divisions concerned with the preparation of prophylactic biological products. The arrival of cases of *cholera* among immigrants from India and infected ships from China brought heavy demands for *cholera* vaccine from the Quarantine Stations and as a precautionary measure it was deemed advisable to increase the stocks of that vaccine. Later in the year cases of *canine rabies* were reported in Singapore supplies of canine anti-rabies vaccine were prepared, and all dogs on the Island were subjected to prophylactic vaccination. Despite these interruptions, considerable progress is reported in various research investigations.

Mention has been made of the results of therapeutic tests of certain drugs carried out in the Malaria Research Division (see *Malaria* above) this Division also reports the trapping of a number of infected *An. notumbrosus* a jungle swamp breeder and a species which must be added to the already long list of local vectors of malaria. The *filariasis* investigations were continued (see this *Bulletin* 1938 Supp p 168*) Infestation is widespread among the riverine population of Perak the majority due to *Microfilaria malayi*. Entomological investigations indicate that *Mansonia* mosquitoes are the principal local vectors of *Microfilaria malayi*.

Financial—Total expenditure on Medical Department Services in the Federated Malay States amounted to \$4 155 579 in 1937 and in addition the Public Works Department expended \$198 143 on new buildings for hospitals etc and \$79 606 on the maintenance of buildings.

MALAY STATES NOT INCLUDED IN THE FEDERATION

Johore (1937)

The State of Johore lies at the southern extremity of the Malay Peninsula to the north is Pahang, to the north west Negri Sembilan and Malacca, on the west the Straits of Malacca, on the south the Strait north of Singapore and on the east the China Sea. The area of the State is about 7 320 sq miles, almost exactly that of Wales.

Introductory—The general make-up of the Annual Report has been subjected to complete revision with successful results (see this *Bulletin* 1937 Supp p 183* and 1938 Supp. p 184*) The present 8vo volume replaces the former cumbersome foolscap publication the interpretative text is ample and informative large numbers of excellent photographs illustrate the various amenities provided in the interests of public health, and finally the tabular matter is so concisely and conveniently arranged that a considerable economy of space has been effected.

Vital Statistics—The relevant facts read as follows —

Race	Estimated Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
Europeans	930	17	18.3	3	3.2	0	—
Eurasians	330	6	15.8	2	5.3	1	166.6
Malaynans	287,500	11,997	41.8	5,852	21.4	2,143	178.6
Chinese	268,300	12,882	48.0	5,460	20.4	1,592	123.6
Indians	7,600	2,033	28.0	1,617	22.3	404	193.7
Others	3,800	96	25.2	48	12.6	14	145.6
Totals	613 510	27 031	44.1	12,982	21.1	4 154	153.6

The draft Bill of a new *Registration of Births and Deaths Enactment* was published in 1937 no details are supplied.

European Officials resident numbered 134 no invalidings or deaths were recorded. Of resident *Asiatic Officials* there were 7 145 and of these 62 were invalided and 13 died.

Estate Populations—On the 551 registered estates in Johore the monthly average of labourers employed with their dependants was 88,931 during the year 1,211 deaths occurred among estate populations.

Maternity and Child Welfare Work—Maternity cases admitted to and delivered in Government Hospitals numbered 3 026 and among these 57 maternal deaths were recorded.

There are now four *Women and Children's Clinics* for a new clinic was opened at Segamat in October 1937. The work carried out at each of these Clinics is described in detail for present purposes the following summary must suffice. During the year 6,984 women attended for ante-natal examinations, 716 maternity cases were conducted by clinic staffs, and 399 clinic cases were conducted by certified non-Government midwives. In towns where no clinics are established Government Deputy or Assistant Medical Officers assisted by Government or private midwives saw 370 ante-natal cases, conducted 172 confinements and treated 46 post-natal cases.

The 23 733 new patients attending the four clinics during 1937 included 12,396 infants and children. In addition 106,565 visits were made to patients in their own homes by Lady Medical Officers, Maternity Nurses and Midwives.

There were 30 *pupil midwives in training* during the year and 6 of these passed the required examinations and were granted certificates, authorizing them to practise in the State. In addition 12 new midwives were granted similar authority. Arrangements have been made to station subsidized midwives in the *kampungs* to give midwifery assistance to village women. There are four such midwives at present.

School Hygiene—Five English and fifty-five Malay Boys' Schools were visited during the year and 1,643 pupils at the former and 6 044 at the latter schools were medically examined. The general health conditions, cleanliness, etc. of pupils were satisfactory. Thirteen Malay Girls' Schools were inspected and 1,246 pupils examined. Enlarged tonsils and dental defects were the principal conditions noted. Arrangements are made throughout the State for the treatment of school-children during the year 3 785 pupils were treated at Out-door Dispensaries, and 38 690 by the Motor Travelling Dispensaries.

A new *Dental Clinic* for the treatment of school-children was opened at Batu Pahat (see this *Bulletin* 1938 Supp. p. 185*) and steps are being taken to establish similar clinics in other localities. During the year 4 649 pupils were examined and 3 717 were found to require treatment. A striking feature is said to be the growth in the appreciation of dental treatment by Malay girls.

Public Health Sanitation etc.—The newly created *State Medical Board* functioned throughout the year and proved of value in keeping the Department in touch with public opinion and the medical needs of the various districts of the State (see this *Bulletin* 1938 Supp., p. 185*). About 16 per cent. of the total population in Johore live in the *Town Board* areas. For each of these areas a brief account of public health activities is provided and such matters as *conservancy water supplies, housing markets* etc., are discussed. Only meagre references are made to *rural sanitation*.

Anti-malarial work continued to be carried out as usual under the authority of the *Anti Malaria Board* the work carried out by the three Divisional Health Officers and their staffs is described in detail but

calls for no special comment (see this *Bulletin* 1938 Supp pp 185*-186*)

Under the heading of *Estate Hygiene* it is reported that 826 visits were paid by Health Officers and their staffs to the 351 registered estates in the State recommendations made for the improvement of lines water supplies latrines, etc. were in most cases carried out

Port Health Work—During the year 80 steamers called at Johore ports and 11 were examined no cases of infectious diseases were reported Vessels engaged in the local coasting trade are not inspected

Hospitals Dispensaries etc—A very considerable building programme is in progress and a large number of buildings and extensions of various kinds were either completed or under construction during the year The following Table summarizes the details of bed accommodation and volume of work dealt with in 1937 at the 15 hospitals in the State —

Institution	No of Beds	Patients Admitted	Patients Treated	Hospital Deaths
Johore Bahru General Hospital	630	11 451	11,801	918
Muar " "	280	6 550	6 744	353
Tangkak " "	128	3 011	3 123	129
Batu Pahat	185	3 982	4 105	217
Kota Tinggi " "	140	2,661	2,738	121
Segamat " "	182	5 309	5 479	347
Kluang " "	204	4,859	5 145	315
Mering	60	1 028	1 089	56
Pontian Rechul " "	68	1 194	1,219	33
Two Military Forces Hospitals	24	418	423	—
Mental Hospital	1 104	206	712	40
Lepor Asylum	250	114	359	14
Two Gaol Hospitals	44	259	277	5
Totals, 15 Institutions	3,270	41 142	43,234	2,350

There appear to be 17 *Out-door Dispensaries* 5 *Motor Travelling Dispensaries* and one *Muar River Motor Boat Dispensary* (these are exclusive of the numerous *Special Clinics* in the State) The work at these and other centres may be summarized as follows —

Item	New Cases	Total Treatments
17 Out-door Dispensaries	84 364	133 636
5 Motor Travelling Dispensaries	56 636	120,875
1 Motor Boat Dispensary	5 888	8 574
All other centres	81 912	85,557
Totals	258,800	348 642

The *training of Nurses* was continued throughout the year at the Johore Bahru General Hospital during the year 17 candidates completed the course and were posted as Probationer Nurses. A new hostel for nurses is under construction and approaches completion.

Courses of training for *Hospital Dressers* are also provided at this Hospital and at the Muar Government Hospital and examinations are held annually.

There are 40 *Estate Hospitals* in the State. The only details supplied for these institutions appear to be the numbers of cases treated of the 12 more important diseases of these there were 113,597 and 1 211 deaths.

The notes which follow briefly refer to some of the more outstanding items of morbidity experience commented upon in the Report under review.

No cases of *plague cholera* or *smallpox* were reported during the year. Over ten thousand rats were examined but none was found infected with *P. pestis*. During the year 24,559 anti-smallpox vaccinations were performed, 16,593 of these by the five special Government Travelling Vaccinators. Dangerous infectious diseases notified included the following —

Of fevers of the *enterica* group 301 cases with 70 deaths. With the exception of 20 non-fatal cases, all were treated in Government Hospitals. There were recorded 641 cases of *dysentery* with 103 deaths and 629 cases of *diarrhoea and enteritis* with 112 deaths all were treated in Government Hospitals. In *Estate Hospitals* 1,047 cases of *dysentery* with 33 deaths and 2,966 cases of *diarrhoea* with 42 deaths were recorded.

For purposes of convenience and economy of space certain other infectious diseases notified during the year can be summarized as follows —

Disease	Treated in Hospitals	Deaths	Treated outside Hospitals
Tropical typhus	3	0	—
Japanese river fever	1	0	—
Scarlet fever	1	0	1 non-fatal case
Cerebrospinal fever	10	8	1 fatal case
Diphtheria	63	7	9 non-fatal cases
Chickenpox	106	11	20 " " "
Measles	606	1	559 " " "
Erysipelas	17	5	3 " " "
Acute polyomyelitis	2	0	—
Encephalitis lethargica	1	1	—

Among the most prevalent diseases treated in Government Hospitals, malaria heads the list with 7 785 microscopically diagnosed cases, with 268 deaths. 1,333 cases of *unspecified malaria* with 44 deaths, while *unspecified fevers* accounted for 265 cases and 7 deaths.

In *Estate Hospitals* 12,391 cases of *malaria* with 159 deaths, and 17 123 cases of *fever unspecified* with 23 deaths were dealt with.

At Government Hospital Laboratories and Dispensaries 58,558 blood films were examined for the presence of malaria parasites and 9,299 gave positive findings. Among the positives *subtertian* infections accounted for 49.4 per cent. *benign tertian* 31.4 *mixed infections* 18.0 and *quartan* 1.2 per cent.

Of *pulmonary tuberculosis* 693 cases were treated in Government Hospitals with 277 deaths, while deaths in the State due to this cause

totalled 558. The usual routine medical examinations of Government officers for signs of pulmonary tuberculosis were carried out and 2,688 persons were examined during the year. Hospital cases of pneumonia numbered 948 and deaths 399. In the State as a whole 950 deaths were registered as due to pneumonia.

In *Estate Hospitals* there were recorded 128 cases of pulmonary tuberculosis with 17 deaths and 1,032 cases of pneumonia with 262 deaths.

Beriberi was the registered cause of death of 254 persons during the year under review. For this cause 372 patients were treated in Government Hospitals and 33 died while in Estate Hospitals 325 cases were treated and 14 deaths recorded.

To the *Leper Asylum*, Johore Bahru, 114 patients were admitted during the year, 14 died, 18 were discharged and 62 absconded, leaving at the end of the year 267 patients still on the books of this institution.

Other diseases mentioned in the Report under review included the following —

Item	Government Cases	Hospitals Deaths	Estate Cases	Hospitals Deaths	Deaths registered in the State
Violence (all forms)	2,097	39	7	7	298
Ankylostomiasis	1,256	10	5,414	7	18
Ulcers	1,002	0	4,241	2	7
Veneral diseases	1,332	8	502	3	37
Yaws	45	0	7	7	7
Influenza	2,074	10	7	7	8

Scientific—At the Laboratories of the General Hospital, Johore Bahru and the Government Hospital, Muar, 75,291 bacteriological and pathological examinations were made during the year. These included the examination of 33,423 blood films, 6,642 Wassermann and Kahn reactions, 2,750 Widal's and other agglutinations, 2,926 examinations of sputum and 3,490 examinations of specimens of urine. In addition a large number of specimens were examined at other Hospitals and Dispensaries in the State, among them 25,133 blood films, 3,365 samples of sputum smears etc. and 19,095 faecal specimens. Details of this work are set out in a series of tabular statements together with the findings recorded.

Financial—Total expenditure on Medical Department services during 1937 amounted to \$1,555,628, a sum which represents 7.8 per cent. of the total revenue of the State during the same year.

Kedah (1937)

Kedah, a Malay State under British protection, lies on the west coast of the Malay Peninsula. It is bordered on the interior by Siam and Perak, and includes the island of Langkawi and a number of smaller islands to the south. The mainland is about 105 miles long and about 65 miles wide at its widest part. Its area, including the Langkawi group of islands, is about 3 618 sq. miles.

Vital Statistics—The data relating to population, births, deaths etc. continue to be presented in great detail in a number of tabular statements (see comments below). As mentioned in the previous issue of this *Supplement* deaths in early life appear to be a feature of Kedah mortality experience—during the year under review approximately 50 per cent. of the total deaths registered occurred at ages 0-20 years, and no less than 45 per cent. in the 0-5 age-group alone. The principal facts for the State as a whole read as follows—

Race	Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
Malays	319,200	11,654	36.5	6,265	19.6	1,480	127
Chinese	83,472	3,748	43.8	1,914	22.4	505	133
Indians	64,402	2,007	35.6	1,407	24.9	432	215
Non-Asiatics	631	7	11.1	1	1.6	—	—
Others	13,010	243	11.4	191	14.9	21	85
Totals	474,776	17,664	37.2	9,781	20.6	2,436	136

As regards *Estate Populations* the relevant data are set out in similar fashion for purposes of comparison, viz.—

(a) European Holdings.

Race	Estate Population	Births	Birth Rate	Deaths	Death Rate	I.M.R.
Malays	5,769	69	11.0	31	3.6	203
Chinese	1,805	31	17.3	13	7.2	129
Indians	36,112	1,359	38.5	903	25.0	251
Javanese	61	—	—	—	—	—
Others	108	1	9.3	1	9.2	—
Totals	43,842	1,490	33.9	938	16.8	255

(b) Asiatic Holdings.

Race	Estate Population	Births	Birth Rate	Deaths	Death Rate	I.M.R.
Malays	7,559	25	3.3	17	2.3	160
Chinese	3,091	15	4.8	9	2.9	8.7
Indians	2,287	23	12.2	26	11.4	107
Javanese	44	—	—	—	—	—
Others	80	—	—	—	—	—
Totals	13,061	63	5.2	52	3.98	273.8 (see below)

With regard to the above data relating to population on Estates it should be added that though numerous tabulations of facts are supplied some of the calculated rates appear to be incorrect and in other cases discrepancies are noted between different statements relating to similar facts. For example in Table XXI.B the crude birth rate on Asiatic Holdings is given as 20.4 per 1 000 but the 68 births related to a population of 13 061 give a birth rate of 5.2 per 1 000. In Table V.D dealing with Asiatic mortality data the crude death rate is published at 16.5 per 1 000 but 52 deaths related to a population of 13 061 give a death rate of 3.9 per 1 000. Table XI.A gives the deaths on Asiatic Holdings as 23 but Table XVI records them as numbering 52. The infant mortality rates on Asiatic Estates do not appear to be convincing—three specific rates are quoted in Table XXI.B as 160, 107 and 67 respectively yet the gross rate for all nationalities is given as 273.8 per 1 000 births. As a matter of fact on the basis of data supplied in Table XI.A the specific rates for Malays, Indians and Chinese are 200, 214 and 67 respectively and the rate for all communities 176 per 1 000 births. The Report observes: "Figures for Asiatic Estates are known to be inaccurate. This remark is presumed to relate to the raw data supplied from these sources and not to the arithmetic applied to the facts for the calculation of rates."

The usual statement dealing with the health of *European Officials* seems to have been omitted from the Report under review.

Maternity and Child Welfare Work—It is stated that though it is yet too early to seek the benefits resulting from the introduction of the *Kampong Midwifery Service* (see this *Bulletin* 1938 Supp. p. 189*) yet a most successful beginning has been made. The four locally trained midwives posted to kampongs will have an uphill fight before they completely overcome the conservatism of Malay women and succeed in combating the opposition of the old *bidans* but strenuous efforts are being made to surmount these and other difficulties. Four more midwives are to be posted to kampongs and four new pupils are to commence their training. In addition to the introduction of this service with a view to the improvement of midwifery practice the new *Midwives Enactment* aims at the control of midwifery by the establishment of a system of compulsory registration and organized supervision—so far the new law applies only to the three largest towns *viz.* Alor Star, Sungei Patani, and Kulim.

The work of the Lady Medical Officer in charge of Maternity and Child Welfare has again proved of immense value—the record of the year's work reads as follows—

Item	Women's and Children's Clinics		
	General Hospital	Town Dispensary	Other Dispensaries
First Visits	691	2,102	—
Subsequent Visits	761	3,309	—
Injections (for Yaws)	2,107	—	284

School Hygiene—The provisional approval of Government has been obtained sanctioning the appointment of an additional Assistant Health Officer primarily intended for general health work in North Kedah but concentrating his activities upon laying the foundations of a regular School Medical Inspection Service. During the year under review all Malay Vernacular Schools not visited in the preceding year were inspected in the course of these visits opportunities were used for giving brief talks on health matters to school-children. Various recommendations were made with a view to improving the sanitary conveniences of school premises and for remedying minor defects. Three Chinese schools were visited and inspected at the request of the Registrar of Schools. Chinese schools are not subject to the routine visits paid by the Medical Department. Upwards of 5,000 school children were examined in nine districts and 206 of them were found to have enlarged spleens spleen rates ranged from nil to 13.3.

As regards the volume of work dealt with in connexion with the School Medical Service it is noted that 39 Malay Vernacular Schools, and 4,690 school-children were inspected. 3 non-Government Chinese Schools and 189 children were inspected. The principal defects recorded during the medical examination of school-children may be summarized as follows—

Defects	Percentage of defects recorded in —	
	Malay Vernacular Schools	Non-Government Chinese Schools
Cases Class I	9.5	10.6
II	8.7	7.1
III	7.3	16.3
Scabies	5.9	4.7
Eye diseases	0.3	3.6
Enlarged spleen	4.1	1.2
Anaemia	1.9	2.4
Yaws	1.7	nil
Not vaccinated	2.1	5.9

Public Health Sanitation etc—The various increases in Departmental staff necessitated by the reorganization of Medical Services (see this *Bulletin* 1938 Supp p 190*) received the approval of Government. New services provided or contemplated are mentioned in appropriate sections of the present Summary. Malaria control work in the three principal towns continued along lines previously described in rural areas where anti-larval measures are impracticable, drug prophylaxis was continued.

In the nine Sanitary Board areas (see this *Bulletin* 1938 Supp p 190*) little has been done to improve methods of *sewage disposal*. Considerable attention was devoted to the improvement of *water supplies* during the year schemes envisage the provision of filtered and chlorinated supplies to all the large towns and extension of supplies to rural dwellers. These schemes can only be developed with the *gradualness of time*. As regards *housing and town planning* it is stated that in the larger towns considerable demolition of old and

insanitary houses was carried out during the year and that building layouts have been prepared for use in both large and small towns. Certain areas have been gazetted so that future building can be controlled.

Health conditions on estates mines etc continued to receive attention and the Health Board Scheme applicable to such properties functioned smoothly. All European Estates were visited at least once during the year but it is again noted that a large amount of extra work was entailed in the supervision of Asiatic Estates owing to the obstruction of the majority of owners. Improvement in housing conditions sewage disposal water supplies etc on various estates is recorded.

Quarantine restrictions were applied against the arrival of passengers and various commodities from Siam on account of cholera. Railway passengers subjected to routine inspection at Padang Besar numbered 12,756.

Hospitals Dispensaries etc—A considerable amount of building and general activity featured the year under review. The new schemes of work envisage the provision of a Dental Clinic and Tuberculosis Department at the General Hospital Alor Star provision of a Venereal Diseases Clinic as a branch of the Town Dispensary Alor Star new dispensaries in three areas structural additions to various hospitals etc.

Further extension of the chain of *kampung* dispensaries will ensure that the whole of the rice-growing population in North Kedah will shortly be provided for similar provision for the remoter areas of Central and South Kedah are also under consideration.

The *training of dressers* has now been brought into line with the schemes of work followed in the Straits Settlements and Federated Malay States. One dresser is to attend the Pharmacy course at the Singapore College of Medicine and one Health Inspector is attending the course of study leading up to the Diploma of the Royal Sanitary Institute.

As regards the volume of work dealt with at medical institutions providing for the needs of the general public and Government Officials, the following details have been extracted—

Hospital	In-patients			Out-patients		
	Beds	Treated	Died	New Cases	Re-visits	Totals
Alor Star	300	6 952	325	10,208	2,856	13 064
Sungei Patani	300	6 729	298	7 048	1 485	8,533
Baling	35	347	13	3 548	1 042	4,590
Kulim	210	4,678	290	9,399	2,444	11,843
Langkawi	70	498	23	3,230	501	3 731
Prison Sick Wards.						
Alor Star	7	129	—	1,291	4 891	6,282
Sungei Patani	7	—	—	120	698	818
Totals	915	19,531	889	34 844	14 017	48,861

5 Outdoor Dispensaries, Alor Star	31,501	14,649	46,150
1 Dispensary Sik (Central Kedah)	3,447	394	3,841
1 " " Bandar Bahru (S Kedah)	2,175	364	2,539
1 Padang Mambang (Langkawi)	70	48	516
4 Motor Travelling Dispensaries (1 each District)	20,783	2,738	23,521

The above details refer to State Hospitals. The medical requirements of the large labour forces on rubber estates are met by the Health Board organization hospitals maintained by the Health Board groups accommodate a total of 1063 beds. Each hospital has an outdoor dispensary. To Group Hospitals on European Estates 22,679 patients were admitted and 717 died, the corresponding figure for hospitals on Asiatic Estates being 855 and 20 respectively. The notes which follow summarize the principal references to morbidity experience during 1937 taken from the Report under review.

No case of cholera or plague was reported. The cholera epidemic in Siam gave rise to considerable anxiety and special precautionary measures were taken (see Quarantine above). No anti-plague measures have ever been enforced though rats are found in abundance in all centres of population.

Fifteen cases of smallpox were reported from South Kedah four of them terminating fatally. The first case (a Chinese woman newly arrived from China) all other cases occurred among Malays on a rubber estate) occurred on June 28th and the last on July 24th. A special vaccination campaign was instituted and 27 400 estate employees were vaccinated. Total vaccinations in the State numbered 41 333.

A prolonged epidemic of measles occurred chiefly on estates and among Indian labourers. The infection was introduced by newly arrived Indian labourers. Notified cases numbered 1443 and 28 deaths were ascribed to this cause. It is said that a considerably larger number of deaths occurred, certified as due to broncho-pneumonia which should have been assigned to measles. One fatal case (an Indian) of tropical typhus was recorded.

No epidemic of malaria was recorded, cases dealt with show an increase over the 1938 figures but fewer deaths were assigned to the disease, the recorded facts being 7 007 cases and 580 deaths. On the other hand deaths ascribed to "fevers unspecified" numbered 3 494, so that this title becomes responsible for 38 per cent. of the total deaths in the State due to all causes. As regards malaria on estates 13 164 cases of malaria and unspecified fever and 67 deaths were recorded. The majority—12,545—of the cases occurred on European estates but while on European holdings deaths due to malaria constituted 6 per cent. of the total deaths due to all causes, on Asiatic estates the corresponding ratio stood at 25 per cent. With regard to the data relating to Asiatic holdings the Report adds "It is impossible to consider these figures as of any value whatever for statistical purposes".

Of enteric fever 69 cases and 10 deaths were notified, and of dysentery and diarrhoea 520 cases with 370 deaths. It is also stated that in

State hospitals 244 patients were treated for dysentery and 16 died and in Group Hospitals (estate populations) 312 patients were admitted and 33 died [i.e. a total of 556 in patients alone treated for dysentery]

Mention has been made of the proposed establishment of a *Tuberculosis Department* at the General Hospital Alor Star (see *Hospitals* above) and with this aim in view Dr P. T. K. NAYAR, one of the Assistant Medical Officers attended an intensive course of study of modern methods of treatment of tuberculosis at the Brompton Hospital London. The scheme aims at the provision of a fully equipped and special ward and the establishment of an out patient clinic—a modest beginning has already been made to provide these special T.B. services. In patients at State Hospitals treated for *pulmonary tuberculosis* numbered 442 and 136 died for *other respiratory diseases* 694 cases and 71 deaths were recorded. To the Group Hospitals (estate populations) 473 patients were admitted suffering from *pneumonia* and 146 deaths were ascribed to this cause.

Other diseases—During the year in the State as a whole 301 deaths were registered as due to *ankylostomiasis* 647 cases were treated in State Hospitals with 13 deaths and 226 in Group Hospitals with 2 deaths. *Beriberi* caused the deaths of 144 persons 99 of these being Malays 31 Chinese and 11 Indians—no mention of the special investigation of lines of treatment is made (see this *Bulletin* 1938, Supp. p. 193*). *Kedah lepers* continue to be accommodated and treated at the four institutions outside the State—during the year 213 were under treatment 14 died and 16 absconded. In a special Appendix the new policy regarding the control of leprosy is discussed (see below *Scientific*). Deaths ascribed to *syphilis* numbered 29. A special *Veneral Diseases Clinic* is to be established in a room which is to be set aside for this purpose in the new Town Dispensary, Alor Star. The new *Dental Clinic* (see this *Bulletin* 1938, Supp. p. 190*) has functioned with success since its opening in October 1937—during the last three months of the year 215 new cases and 250 re-visits were recorded.

Scientific—Each of the five State Hospitals has its own branch laboratory and during the year 43,728 specimens were examined. At the Central Laboratory Sungai Patani, 7,413 specimens were examined but findings are not recorded.

Three special Reports appear as Appendices to the Report under review viz—

1. *A Health Survey of Langkawi Island* by Dr E. D. B. WOLFE who records the results of his examination of 2,800 persons the sanitary condition of the island etc.

2. *The New Policy regarding the Control of Leprosy* which aims at abolition of the former system of compulsory isolation by means which will induce sufferers to seek treatment voluntarily etc.

3. *Report of a case of Hydrophobia* by Dr R. SIVASAMBANDAN

Financial—Total expenditure on Medical Department services during 1937 amounted to \$551,225

Perlis (1937)

Perlis is the most northerly of the Malay States, lying on the west coast of the Malay Peninsula. It is bordered on the interior by Siam to the north and Kedah to the south, and has an area of about 318 sq miles.

Vital Statistics—It is stated that the registration of births and deaths will eventually be carried out by an Assistant Medical Officer trained by the Senior Health Officer Kedah. The relevant vital statistics for 1937 are shown in the following Table—

Nationality	Population	Births	Birth rate	Deaths	Death rate	Infant Deaths	L.M.R.
Europeans	7	—	—	—	—	—	—
Eurasians	8	—	—	—	—	—	—
Chinese	6,224	257	41.5	173	27.8	37	144
Malays	42,497	1,474	35.9	723	16.7	14	98
Indians	977	23	23.5	23	23.5	3	130
Others (mostly Siamese)	1,992	39	19.6	44	22.1	7	179
Total	52,703	1,793	34.0	963	18.3	189	105.4

[The Table on page 49 entitled "*Stillbirths according to Nationality and Sex*" actually presents *live* births with these distinctions 105 stillbirths were recorded.]

There were 3 resident *European Officials*. *Arabic Officials* resident numbered 300 with the same average number resident seven were invalided and two died.

The population of labourers and their dependants on *estates* totalled 436, distributed as to 361 Indians, 74 Malays and a single Chinese. Fifteen births and six deaths—all Indians—were recorded.

Maternity and Child Welfare Work—One of the midwives trained at Alor Star for the newly created *Kampung Midwifery Service* (see p 187* *supra* and this *Bulletin* 1938 Supp. p 184*) was duly posted to her kampong in Perlis and another pupil midwife has commenced her course of training. During the year 13 deaths were registered as due to diseases of pregnancy childbirth and the puerperal state. The Hospital midwife attended 4 labour cases in the homes of patients.

School Hygiene—For the first time all women teachers in Malay Vernacular Schools were medically examined by the Lady Medical Officer Kedah. Owing to the absence on leave during part of the year of the Assistant Medical Officer and of the Assistant Health Officer when attending a course of training in Kedah the volume of work accomplished was somewhat less than usual. Ten schools were inspected and 948 children medically examined, the principal findings being summarized as follows—*dental caries* 30.8 per cent. *enlarged spleens* 17.5 per cent. *anacida* 17.2 per cent. Only 0.1 per cent. were affected with yaws. 37 children received N.A.B. injections for the disease.

Public Health Sanitation etc.—The work of the Medical Department, Perlis is supervised by the State Surgeon Kedah (Dr J. PORTERLY).

who reports that the general health of the Perlis population during 1937 was good. Routine anti malarial measures continued to be carried out and it is hoped by better control and by anti larval and drug prophylaxis to reduce malaria incidence in the endemic areas in course of time. Methods of *sewage and refuse disposal* remain as previously described (see this *Bulletin* 1938 Supp p 194*). As regards *water supplies* these remain as described in the previous issue of this *Supplement* reference is again made to the proposed installation of a filter plant at Padang Besar (see this *Bulletin* 1938 Supp p 194*). Kaki Bukit still obtains its supply from sources liable to pollution the provision of safe supplies can only be met by the removal of the villages to a new site and this matter is receiving the attention of the authorities. Additions and improvements to market stalls are reported shops street stalls and hawkers are inspected at regular intervals and licences issued only when prescribed sanitary standards are maintained. Steps are being taken to deal with unsatisfactory itinerant hawkers. *Hospitals Dispensaries etc.*—New Buildings for the accommodation of certain members of Medical Department staff were completed and occupied and various additions made to existing buildings during the year. The medical institutions provided for in patient and out patient treatments remain as previously described (see this *Bulletin* 1938 Supp p 194*). At the General Hospital Kangar 1 707 in patients were dealt with and 89 deaths were recorded 36 of these deaths occurring within 48 hours of admission. 806 of the patients were Chinese 594 Indians and 288 Malays. Out patients treated at this Hospital numbered 5 443 and of these 3 286 were Malays 1 211 Indians and 887 were Chinese. [The racial proportions among in patients and out patients are striking. Among in patients Chinese head the list with 47 per cent. while only 17 per cent were Malays but among out patients the positions become reversed Malays 60 per cent Chinese 16 per cent.] The Outdoor Dispensary at Kaki Bukit dealt with 6 315 new cases and the Travelling Dispensary 411 cases (exclusive of those treated at Schools Coolie Lines etc.) In common with usual experience *malaria* and *fevers unspecified* were responsible for the largest proportions of the total deaths registered in Perlis during 1937—no less than 41 per cent of the deaths due to all causes appear under these two titles. Only 19 deaths were specifically assigned to *malaria* but 376 were due to *unspecified fevers*. Types of infection are not differentiated in the Hospital Returns but Hospital in patients treated for malaria numbered 457 and 10 died. among 4 872 blood films examined at the Hospital Laboratory Kangar 1 912 contained malaria parasites the percentages and types being *benign tertian* 51 4 *subtertian* 38 5 *mixed infections* 9 8 and *quartan* 0 3 per cent. Larval surveys indicated *A. barbrostris* as the most prevalent type followed in descending order by *A. kyrcanus* and *A. maculatus*. Twelve cases of *cerebrospinal fever* (all Chinese and mostly mining coolies) were notified. Eleven of the cases occurred in Kaki Bukit and its suburbs an insanitary area where conditions are ideal for the spread of such a disease. Ten of the cases were treated in Hospital with 5 deaths. Prompt and energetic action succeeded in suppressing the outbreak. No case of *typhus* or *smallpox* was reported. 1 796 vaccinations were performed.

Rabies—Seven persons were bitten by dogs actually suspected of being rabid—two were treated at Alor Star and Kangar Hospital. One refused treatment and died a month another reported at the Hospital a month after the bite and hydrophobia the day after admission and died. (This case is in the Kedah Report above.) The brains of two dogs at Institute for Medical Research Kuala Lumpur were declined for rabies.

Ten deaths were ascribed to *enteric fever* in the State and four cases of *typhoid fever* with one death and one fatal *paratyphoid* were treated in Hospital. Hospital patients in *dysentery* numbered 29 and 3 deaths were recorded. 14 of the were suffering from the amoebic type of the disease.

Forty-seven deaths were registered as due to *pulmonary* in cases admitted to Hospital numbered 54 and of these pulmonary 11 hospital deaths were recorded. Death *pneumonia* (all forms) in Perlis totalled 23. 44 cases with appear in the Hospital Returns.

Of the 4 Perlis *lepers* one was accommodated at the Pul Leper Settlement Straits Settlements and three at Sun P.S.S.

Other diseases mentioned in the Hospital Returns include *ankylostomiasis* 107 of *influenza* 54 of *ulcers* and 32 of

In the tabulated *causes of death* it is noted that 48 deaths, to "Demam Batak" a term which vaguely connotes *fever*.

Scarcity—Of the 8,205 specimens examined at the 14,872 were the blood-films already mentioned under preceding notes. As regards the remainder these included specimens 1,252 giving positive findings and 283 a specimen of which 32 contained *Mycobacterium tuberculosis*.

Financial—Expenditure on Medical Department for 1937 amounted to \$45,649 a sum which represents 6 per cent total revenue or 7 per cent of the total expenditure during the year under review.

Kelantan (1937)

The State of Kelantan is on the eastern side of the Malay Peninsula the north is the China Sea, on the south Pahang, on the east Trengganu and the China Sea, on the west Perak and Siamese Territory area is estimated at 6,720 sq. miles or rather less than the Yorkshire.

Vital Statistics—Births and deaths registration became only in July 1930. It is said that amongst Malays an registration is fairly complete but information is lacking births and deaths occurring among aboriginal hill districts of Ulu Kelantan, where many to be found. The relevant facts for the year follows—

Race	Estimated Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
Europeans	80	2	25.0	3	37.5	1	?
Malays	354,844	9,733	24.8	6,278	17.7	1,099	112.9
Chinese	27,034	698	25.8	396	14.6	64	91.7
Indians	10,401	225	21.6	200	19.2	48	213.3
Eurasians	72	0	—	2	27.8	0	0
Others	7,947	153	19.2	106	13.3	9	58.8
Totals	400,378	10,811	27.0	6,935	17.4	1,221	112.94

Deaths are classified in the Report under review by race age groups and by principal causes.

Of *European Officials* there were 28 resident with the same average number resident no invalidings or deaths were recorded. Of the 1,057 *non European Officials* with the same average number resident it is noted that eleven were invalided and five died during the year.

The total labour force with their dependants on *Estates* is returned as 6,135 but these are exclusive of *Estates* employing entirely Malay or Chinese labour as for such properties data are not reliable. Of the total of 6,135 persons 3,736 were Indians and their dependants and among this group 111 births and 109 deaths were recorded giving birth and death rates 29.7 and 29.2 respectively. There were 33 infant deaths so the infant mortality rate would be 297.2 per 1,000 registered births.

Maternity and Child Welfare Work—There is no special Maternity Hospital in the State but maternity beds are available at the Kota Bharu Hospital where however in spite of every effort services are not so far popular among Malay women. During the year 187 deliveries were recorded at the Hospital and of these 122 were Indian women, 59 were Chinese but only 1 was a Malay. Free facilities are provided for ante-natal treatment and delivery of women from *Estates*. Provision was made for the training of four Malay *bidans* but owing to the illiteracy of Malay women, difficulty was experienced in obtaining suitable candidates with the result that only one was selected to commence the course of training (see this *Bulletin* 1938 Supp. p. 197*).

An *Infant Welfare Centre* was started in premises acquired in the market area of Kota Bharu the work being under the charge of a part time Assistant Lady Medical Officer assisted by an Infant Welfare Nurse. This undertaking has made a most successful beginning the clinic is popular and attendances have steadily increased month by month. The Health Nurse after her daily work at the Clinic visits homes in Kota Bharu and in adjacent kampongs from which births have been reported. The record of the year's work shows that 1,343 visits were paid to newly-born infants 1,497 visits were paid to women (958 of these to Malay women) and 1,173 to children (of the latter 703 were Malay children).

School Hygiene—During the year 1 English and 42 Malay Vernacular Schools were inspected and 2,898 school-children medically examined. In towns the general sanitary condition of the schools is satisfactory and it is also said that in areas where anti-malarial measures are efficiently carried out spleen rates are low. Among

Rabies.—Seven persons were bitten by dogs actually rabid or suspected of being rabid two were treated at Alor Star and three at Kangar Hospital. One refused treatment and died a month later and another reported at the Hospital a month after the bite and developed hydrophobia the day after admission and died. (This case is referred to in the Kedah Report above.) The brains of two dogs sent to the Institute for Medical Research, Kuala Lumpur were declared positive for rabies.

Ten deaths were ascribed to *enteric fever* in the State as a whole. Four cases of *typhoid fever* with one death and one fatal case of *paratyphoid* were treated in Hospital. Hospital patients treated for *dysentery* numbered 29 and 3 deaths were recorded. 14 of the patients were suffering from the amoebic type of the disease.

Forty-seven deaths were registered as due to *pulmonary tuberculosis*. Cases admitted to Hospital numbered 54 and of these 51 were pulmonary. 11 hospital deaths were recorded. Deaths due to *pneumonia* (all forms) in Perlis totalled 23. 44 cases with 15 deaths appear in the Hospital Returns.

Of the 4 Perlis *lepers* one was accommodated at the Pulau Jerejak Leper Settlement Straits Settlements and three at Sungai Buloh, F.M.S.

Other diseases mentioned in the Hospital Returns include 82 cases of *oxyuriasis* 107 of *influenza* 54 of *ulcers* and 32 of *chickenpox*.

In the tabulated *causes of death* it is noted that 46 deaths are ascribed to *Demam Batok* a term which vaguely connotes *feverish cough*.

Scientific.—Of the 8,205 specimens examined at the Laboratory 4,872 were the blood-films already mentioned under *malaria* in the preceding notes. As regards the remainder these included 1,740 faecal specimens 1,252 giving positive findings and 283 specimens of sputum of which 32 contained *Mycobacterium tuberculosis*.

Financial.—Expenditure on Medical Department services during 1837 amounted to \$45,649 a sum which represents 6 per cent. of the total revenue or 7 per cent. of the total expenditure of the State during the year under review.

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Vital Statistics.—Births and deaths registration became compulsory only in July 1830. It is said that amongst Malays and other races registration is fairly complete but information is lacking regarding births and deaths occurring among inhabitants of the remote and hilly districts of Ulu Kelantan, where many aboriginal tribes are to be found. The relevant facts for the year under review read as follows:—

Race	Estimated Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
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other findings it is said that minor skin diseases are common and the percentage among children examined was 21.8 dental caries is equally prevalent with 21.2 per cent. of the pupils examined, anaemia was present in 5 per cent., and diseases of the eye in 2.6 per cent. while 48 cases of active yaws were detected and referred for treatment. A list of pupils and their defects is given to the teachers in towns necessary treatments are supplied at Hospitals and Dispensaries and in rural areas by Travelling and Pack Dispensaries during the course of their weekly visits Hygiene is taught in the schools by teachers.

Public Health Sanitation etc—The lack of a satisfactory index of the general health of the State is again referred to (see this *Bulletin* 1938 Supp. p. 197*) For purposes of public health administration the State is divided into five Districts which cover the main centres of population. Anti-malarial work was carried out along lines previously described in the notified areas the zone of control in Kuala Krai was considerably extended. Additional work undertaken during the year included control measures in a Chinese rubber estate near Kuala Krai, the canalizing of the Sungai Krai the construction of earth drains and the replacement of roadside ditches by concrete drains. Frequent larval surveys were undertaken and regular mosquito surveys were continued.

The single bucket system of sewage disposal continues in use (see this *Bulletin* 1935 Supp. p. 160) Considerable extension of the service is necessary for many houses in the towns and kampongs lack sanitary latrines and are still dependent upon primitive methods of disposal of excreta. Every effort is being made to bring about improvement where the erection of new houses and repairs to old ones are approved the construction of sanitary latrine accommodation is made compulsory Kota Bharu is still the only town in the State having piped water supplies but even here shallow wells inadequately protected are largely used. In all premises licensed for the sale or manufacture of foods and drinks the use of piped supplies has been made compulsory. In other towns in the State supplies are obtained from wells, streams and rivers having regard to the fact that bowel diseases are almost universal, provision of piped supplies is a sanitary necessity. Matters concerned with housing and town planning continued to engage the attention of the responsible authorities, defects are being remedied and improvements in existing conditions gradually effected. The inspection of premises where foods and drinks are prepared or offered for sale was continued. It is stated that conditions in remote villages are in need of great improvement.

On Estates subject to medical inspection the housing of labourers, medical aid and all other matters concerned with the physical welfare of employees received considered attention.

No provision exists for the training of sanitary personnel but it is noted that all the Sanitary Inspectors employed hold the Certificate of the Royal Sanitary Institute, London.

Port Health Work—Coasting steamers plying between Singapore and Bangkok call at Tumpat where the Chief Hospital Assistant at the Tumpat Dispensary acts as Deputy Health Officer and inspects all passengers during the year 175 steamers with 433 passengers called at the port but no case of infectious disease was recorded.

Hospitals Dispensaries etc—Hospitals maintained by the Medical Department remain as previously described except that it is necessary to add that certain extensions to existing buildings were completed during the year (see this *Bulletin* 1937 Supp p 192* and 1938 Supp p 193*). In addition to the Out patient Departments established at all Hospitals there are *Dispensaries* at five centres 2 *Motor Travelling Dispensaries* 2 *Outboard Motor Prahu Dispensaries* and 2 *Pack Dispensaries*. The volume of work dealt with by Hospitals and Dispensaries during the year may be set out as follows —

Institution	Admitted	Treated	Deaths	Out patients	Attendances
Hospitals	6 358	6 663	249	40 057	52,292
5 Dispensaries	—	—	—	41 083	66,500
6 Travelling Dispensaries	—	—	—	—	160 469

Information concerning *disease incidence* in the State is available only from the records maintained by Hospitals, Dispensaries and Travelling Dispensaries reference to some of the diseases treated during the year is made in the notes which follow

Malaria is the principal disease and chief cause of death in the State—it is mainly prevalent in the foothills of Ulu Kelantan and is endemic on most of the rubber estates lying along the banks of the Kelantan River. During the year under review there was a marked increase in the number of malaria cases admitted to hospitals attributed in part to the Japanese Iron Mine at Temangan where health conditions remained unsatisfactory with malaria highly prevalent. The advisability of changing the line site on this Mine and erecting lines in clearings remote from jungle is under consideration. Hospital returns show 2 078 patients admitted for malaria and 2 110 treated with 64 deaths and in addition 18 cases of *blackwater fever* admitted from estates and mines were treated with two deaths. Among the total cases treated *subtertian* infections predominated with 1 310 cases of *benign tertian* there were 247 of *quartan* 36 of *malarial cachexia* 187 mixed infections accounted for 13 and in 317 cases the type of infection was not determined

Estate Health Statistics show that among 6 135 persons 1,553 malaria cases were treated with 29 deaths.

At Hospital Laboratories and Dispensaries 8 811 blood films were examined for the presence of malaria parasites but findings are not recorded. Mention has been made in the section *Public Health* above of anti malarial work it remains to add that the species caught during the frequent larval surveys included *A. maculatus* (the chief vector in hilly districts) *A. barbirostris* and *A. hyrcanus* (prevalent in the flat coastal regions) *A. karwari* *A. vagus* and *A. kochi*

No case of *plague* or *cholera* was notified 1 760 anti-cholera inoculations were given to pilgrims to Mecca (see this *Bulletin* 1938 Supp p 199*). Of *smallpox* 8 cases were reported among employees on an estate. Infection was traced to new arrivals from India 13 000 vaccinations were carried out and quarantine measures were applied to the estate. In the State as a whole 26,265 vaccinations

One case of tropical typhus and two of were performed during the year. *dysentery* with one death were reported. Nine cases of *enteric fever* were admitted to Hospitals making with three cases remaining from 1936 a total of 12 cases treated. Four of these patients died. The source of infection was not traced in any of these cases. For *dysentery*, 83 patients were treated in hospitals and 7 died of the total cases 59 were amoebic, and 25 bacillary. *Diarrhoea* and *enteritis* was responsible for 69 in-patient cases and 6 deaths at ages 2 years and over but no cases were recorded at ages under 2 years.

The incidence of *pulmonary tuberculosis* remains high among 180 cases (160 admitted during the year) of all forms of *tuberculosis* 175 were pulmonary and 45 of these patients died. It is said that recorded cases are no true index of the amount of the disease in the State for cases are rarely seen except in the advanced stages. Many of the cases recorded during 1937 were Government servants detected at the routine examination for *pulmonary tuberculosis* each year. Estate Health Statistics show 279 cases of "lung diseases" treated, with 40 deaths. *Pneumonia* another serious cause of disability and mortality was responsible for the admission of 118 patients and 36 deaths during the year.

No reference occurs in the text of the Report to *helminthic infections*. Hospital Returns show that 249 cases were admitted and 259 treated for *ankylostomiasis* and 101 admitted and 103 treated for *ascariasis*. Estate Health Statistics record 64 cases of *ankylostomiasis* dealt with during the year.

Of *leprosy*, the Report observes. The number of lepers in the State is not known, but assuming the incidence rate is in the same proportion as in neighbouring States, the total number must go into thousands" (see this *Buildin* 1933 Supp. p. 199*). A survey of the State for the disease is proposed. There is accommodation in the State for male lepers only near Tampat. During the year 9 lepers were admitted to this small settlement. 19 were treated, 6 absconded and one was discharged. Ten lepers were also accommodated at Pulau Jerejak (Penang) where 2 died, and 2 were accommodated at Sungai Buloh (Selangor). Treatment continued along lines previously described.

Facilities for the treatment of *venereal diseases* remain as described in the previous issue of this Supplement. During the year 2,242 new cases presented themselves for treatment. Among Hospital in-patients there were 101 cases of *syphilis* 57 of *soft chancres* 149 *gonococcal infections* and 54 of *granuloma venereum*. Attendances at all treatment centres for years totalled 26,493 Malay patients accounting for 24,621 of the total attendances.

Among other diseases referred to in the Report under review mention is made of *beriberi*. 25 cases were admitted and 29 treated in Hospitals, but it is said that the true incidence of the disease in the State is not known. For chronic *ulcers* 321 patients were treated, while for wounds by cutting or piercing instruments 720 patients were dealt with.

Scientific.—At Hospital Laboratories 19,730 specimens were examined of these 8,811 were blood films, 4,884 faecal specimens, 4,577 specimens of urine and 477 were specimens of serum submitted for *hahn* tests. The results of these examinations are not supplied. The *Annual Report of the Veterinary Inspector* is presented as an

Appendix to the Report under review. Mention is made of two cases of *rabies* both confirmed by the Institute of Medical Research, Kuala Lumpur. A muzzling order was introduced and instructions issued for the destruction of all unmuzzled dogs.

Financial—Expenditure on Medical Department services in 1937 amounted to £201,945 a sum which represents 7.3 per cent of the total expenditure of the State during the same year.

Trengganu (1937)

The State of Trengganu lies on the eastern seaboard of the Malay Peninsula 4° and 5°5' N lat. and 102°20' and 103°30' E long. It has an area of 5,050 sq. miles.

Vital Statistics—It is considered that registration is now fairly complete with Deputy Registrars established at 42 centres (see this Bulletin 1938 Supp. p. 200*). Any fine analysis of the causes of death would be useless having regard to the fact that less than 3 per cent of the total deaths registered are certified by qualified medical practitioners. The relevant facts for the year under review are as follows—
Estimated mid year population 198,248 registered births 6,845 deaths 4,427 infant deaths 1,202 stillbirths 295. The crude birth and death rates were 34.5 and 22.3 per 1,000 respectively, the infant mortality rate 175.6 per 1,000 live births and the stillbirth rate 43 per 1,000 births.

The average monthly population on *Estates and Mines* during 1937 was 7,202. During the year 84 deaths occurred amongst employees and their dependants.

Europeans resident in the State numbered 27 and of these 20 were European Officials with an average number resident of 14. One invaliding only was recorded but no deaths.

Maternity and Child Welfare Work—There are 5 midwives in the service of the Medical Department and a nurse also qualified as a midwife. Three other qualified midwives are resident in the State one of them employed by the Nippon Mining Company, Dungun. The volume of maternity work dealt with at various centres can conveniently be set down in the following manner—

Centre	Maternity Cases Conducted					Maternal Deaths
	Malays	Chinese	Indians	Others	Total	
Kuala Trengganu Hosp.	13	84	4	1	102	1
Town Clinic (Japanese Midwife)	61	37	1	2	101	0
Berut (Malay Midwife)	50	4	1	0	55	0
Dungun (Indian Midwife)	12	19	0	0	31	0
Kemaman (Chinese Midwife)	3	57	1	1	61	0
Totals	138	201	7	4	350	1

Of the 175 women who made 307 attendances for ante-natal examination at these centres 114 were Malays 52 were Chinese 6 were Indians and 3 were members of other races.

At the Kuala Trengganu Town Clinic 69 patients attended for ante-natal treatment 225 infants under one year of age and 1 117 children between the ages of one and twelve years also attended for treatment. It is hoped to build up gradually *child welfare* services in the districts with the assistance of local midwives. It is interesting to note that infant mortality rates are high in the south and much lower in the north of the State while highly malarious inland districts show lower rates than urban areas. Malaria would not therefore seem to be the major factor in the problem of infant mortality—in inland districts where money is scarce breast feeding is the practice but in the towns sophisticated foods replace the natural method.

School Hygiene.—Twenty three Government Schools and ten Private Schools were inspected during the year and 2,148 children medically examined, which means that 85 per cent. of the children on the registers were dealt with of the total children examined 1,232 were in Kuala Trengganu schools Pupils showing enlarged spleens formed 3 per cent of the total examined spleen rates for coastal towns ranged from 0.8 per cent to 27.4 per cent and for inland areas between 2.8 per cent and 42.9 per cent Signs of yaws were noted in 3.8 per cent of the children examined, mostly tertiary lesions of the hands and feet Dental caries was noted in 50 per cent. of the children A "great number" of the pupils are said to be infected with worms in faecal specimens of 116 pupils in Kuala Trengganu 111 were positive with ova.

Public Health Sanitation etc.—There are now Town Boards at *ten* places (see this *Bulletin* 1938 Supp. p. 202*). During the year the Medical Officer was appointed Health Officer Kuala Trengganu Assistant Health Officers were appointed at Chukai and Dungun, and in smaller places Dressers act as Health Inspectors. It is said that the larger towns are free from malaria and that *anti-malaria measures* are most needed where such are most difficult to implement. Mosquito surveys were carried out by Health Inspectors in various areas. As regards *sewage disposal* a double pit system was inaugurated in Kuala Trengganu superseding the former system and in Kuala Dungun and Chukai the conservancy systems were extended elsewhere conditions remain unchanged (see this *Bulletin* 1937 Supp. p. 196*). Disposal of *refuse* is by controlled tipping in the larger towns and by burning and burying in the villages. The position in respect to *water supplies* remains as previously described (see this *Bulletin* 1937 Supp. p. 196*). In the crowded parts of Kuala Trengganu water sold by bullock cart is obtained from wells potentially dangerous.

Housing and Town Planning matters continue to engage the attention of the Town Boards and progressive improvement is reported.

With regard to *labour conditions* three mines have small hospitals and employ dressers and a fourth has a large hospital and dispensary and employs a qualified Indian sanitary inspector and staff of coolies. Health conditions on estates are said to have been greatly improved. Mines have been reconstructed, piped water supplies installed crèches for children established and anti-malarial works undertaken. All

mines and estates were visited by the Medical Officer or by Assistant Medical Officers and Sanitary Inspectors during the year. Premises licensed for the manufacture and sale of *foods and drinks* are regularly inspected by Health Inspectors.

Port Health Work—The passengers and crews of 241 junks were examined and special precautions taken in view of the continuance of *cholera* in Siam.

Hospitals Dispensaries etc—Additional accommodation was provided by the completion of new buildings during the year. These included new wards to the Kuala Trengganu Hospital the first ward of a new hospital at Kuala Dungun a ward at Chukai Kemaman Hospital where a new hospital is being built. With these additions there are now 213 hospital beds available for in patients. The work performed at all hospitals during the year is detailed hereafter—

Hospital	Beds	Admissions	Treated	Died
Kuala Trengganu, General	158	2,622	—	49
Garol	7	64	—	1
Kuala Dungun	20	453	—	7
Chukai Kemaman	28	275	—	9
Totals	213	3,414	3,538	66

For the treatment of out patients permanent *Dispensaries* are established at 7 centres (these also include Out patient Departments at Hospitals) there are 6 *Travelling Dressers* who deal with cases in outlying villages *vaccinators* who distribute medicines during their visits and 11 *Police Stations* and 4 *Customs Stations* situated in places where there are no dispensaries supplied with stocks of simple drugs. Patients treated during the year were—

	New Cases	Attendances
By Dispensaries and Travelling Dressers	125,740	157,853
Vaccinators	15,822	16,571
Police and Customs Stations	863	863

Hospitals maintained by Mining Companies and Estates have been referred to in the Section *Public Health* above.

The most reliable information as regards the *incidence of disease* in Trengganu is supplied by the statistics of patients treated at Hospitals and Dispensaries and the notes which follow briefly summarize references to some of the prevailing diseases discussed in the Report under review.

The incidence of *malaria* varies widely in different parts of the State these variations being indicated by the spleen rates recorded at the medical examinations of school-children (see *School Hygiene* above). During the year under review there were 579 admissions to Hospitals for the disease (representing 17 per cent of the total admissions) and 587 patients were treated for malaria with 8 deaths. For the total cases treated types of infection were distributed as to 188 *subtertian* 113 *benign tertian* 24 *quartan* 12 were mixed infections 13 malarial *cachexia* and 237 were unclassified. Out patients treated at Hospitals and Dispensaries totalled 20,860. No case of *blackwater fever* was recorded.

Mining Companies with an average monthly population of labourers and their dependants of 5,042, reported 1,247 cases of malaria and 8 deaths. Estates with an average monthly population of labourers and dependants of 2,160 supply no record of malaria cases but report 7 deaths due to this cause.

It is of interest to note that in the State as a whole only 84 deaths were medically certified as being due to malaria while 2,677 deaths were ascribed to unspecified fevers. 19 of the latter were stated to be due to *demon hepialm* which means a long continuous fever and might be enteric or typhus, but no cause can be assigned to the remainder (see also this Bulletin 1938 Supp. p. 203*).

At the Laboratory where 4,180 blood films were examined, 3,603 gave negative findings. The positives included 290 *P. falciparum*, 228 [? 221] *P. vivax*, 33 *P. malariae* and 33 mixed infections.

No case of *plague cholera smallpox* or other dangerous infectious disease was reported during the year. 12,394 anti-smallpox vaccinations were performed and of these 11,742 were primary vaccinations.

Three non-fatal cases of *tropical typhus* were treated at Hospitals. All diagnoses were confirmed by serological tests and typed as to 2 Scrub type (*Proteus* X K strain) and one Shop" type (*Proteus* X V strain).

Only 9 (non-fatal) cases of *enteric fever* were reported. At the Laboratory where 26 Widal reactions were performed, in 5 cases the serum agglutinated positively with *Bact. typhosum* and 1 with *Bact. paratyphosum B*. Sixty-two in-patient and 186 out-patient cases of *dysentery* were dealt with. 19 of the in-patient cases and 24 of the out-patient cases were amoebic dysentery. Six Hospital deaths were ascribed to the disease. On *Mines and Estates* 38 cases of dysentery were recorded. Among 4,230 faecal specimens examined at the laboratory 13 were found to contain the protozoan *E. histolytica* alone or with other infections.

Fifty-one deaths in the State are said to have been due to *tuberculosis*. It is noted there were 78 in-patient cases of tuberculosis (all forms) and of these 74 patients were suffering from the *pulmonary* form of the disease, and 17 died (i.e. 23 per cent. of total hospital deaths). The majority of the patients were Chinese. At the laboratory where 492 specimens of sputum were examined 70 were positive with *Mycob. tuberculosis*.

Beriberi was less prevalent during the year under review. Deaths due to this cause in the State as a whole numbered 23. Cases treated by the Medical Department totalled 1,180 and of these 117 were in-patients of whom 2 died. On Mining properties 291 non-fatal cases were reported. Incidence is said to be greatest among the Chinese, in women it is usually noted after a confinement. It is rare in the interior where home-grown rice is the staple diet but common on the coast. The low mortality is partly attributed to the fact that all cases were treated with concentrated injections of Vitamin B₁.

Helminthic infections are very prevalent. 72 per cent. of the 4,230 faecal specimens examined at the laboratory had some kind of helminthic infestation which was usually multiple with *ancylostoma* present in 27.4 per cent., *ascaris* 52.3 per cent. and *trichuris* 45.2 per cent. Hospital Returns show 111 in-patient cases of *ancylostomiasis* and 143 of *ascariasis*.

Leprosy—During the past five years a register has been kept of all lepers coming to the notice of the Medical Department. Of the 90 persons recorded over the period 28 have died 10 have left the State 6 are at the Leper Settlement Sungai Buloh (Selangor, F.M.S.) 16 cannot be traced and 30 are known to be alive.

Veneral Diseases—It is said that *syphilis* is rarely seen among local Malays and that the majority of the cases are Chinese. Admissions to hospitals with distinction as to race were as follows—

	Malays	Chinese	Indians	Others	Totals
Gonorrhoea	103	54	44	0	201
Syphilis	3	22	7	1	33
Soft Sore and Granuloma venereum	9	11	9	0	29

In addition to the above 1 018 persons received out patient treatment for gonorrhoea. The figures are said to be no measure of the incidence of the disease which is believed to be very common in the towns.

Cases of *warts* treated during the year were *in patients* 231 and *out-patients* 3 694 (see also *School Hygiene* above).

Laboratory Returns show that out of 244 Kahn tests 50 were positive and that 204 out of 368 specimens were positive with *N. gonorrhoeae*.

Other diseases dealt with by the Medical Department included 4 797 cases of *influenza* few cases of *mumps* *chickenpox* *measles* and *whooping-cough* 377 in patient cases of *ulcers* and upwards of 200 of *wounds* and *fractures*. Menaces to life other than those contributed by disease are evidenced by the mention of 8 persons killed by tigers 1 by an elephant and 1 by a snake.

Scientific—The Kuala Trengganu Hospital is equipped with a laboratory and all permanent dispensaries are supplied with microscopes for the confirmation of clinical diagnoses. Specimens examined and findings recorded are summarized in an Appendix to the Report under review and have been referred to in the preceding notes.

Financial—Total expenditure on Medical Department services during 1937 amounted to \$112,516 a sum which represents 4.2 per cent of the total revenue of the State (or 4.3 per cent of the total State expenditure) during the same year.

BRUNEI (1937)

The native State of Brunei lies on the north-west coast of the island of Borneo between North Borneo and Sarawak. It is 770 miles from Singapore and has an area of about 2,230 sq miles or rather smaller than the county of Devon. In Brunei Bay lies the Island of Labuan.

ital Statistics—The estimated population for the year under review is given as 35 963. The native population comprises mainly Malays and Bornean races the only alien race of numerical importance being the Chinese. [According to the 1931 census 89.5 per cent. of the population were Malays and Borneans and 8.9 per cent. were Chinese.]

Regular anti-malarial work is possible only at Brunei and Kuala Belait and both of these centres are said to be kept free from malaria. The disease is common in rice-growing areas but little met with on the rubber estates (see this *Bulletin* 1938 Supp. p. 207*) the relative immunity on the latter properties being ascribed to the absence of *A. maculatus*. The Report under review supplies classified lists of collection of anopheline larvae mosquitoes, breeding places etc.

At the Laboratory where 1,239 blood films were examined 146 were positive with malaria parasites and among the latter 70 were sub-*tertian*, 38 *t. nig. tertian*, 34 *quartan* and 4 mixed infections.

The poor diet of the average native—mainly rice and fish—and its relation to the high infant mortality in the State has been mentioned in the section *Maternity and Child Welfare* above. Plentiful supplies of cheap vegetables and native rice would contribute to bring about improvement, but unfortunately few of the people are interested in agriculture and methods of cultivation are primitive. The recent appointment of a European Agricultural Officer may serve to remedy existing conditions. Hospital Returns show that 24 cases of beriberi, one of infantile beriberi, 3 of *aristolosis*, 3 of *malnutrition* and one of rickets were dealt with.

Although only one fatal case of *diphtheria* was notified (from Kuala Belait) it was noteworthy as being the first case of the disease ever reported in the State. Examination of close contacts failed to reveal any carrier.

Two cases of *typhoid* and 5 of *paratyphoid fever C* were treated as in-patients with one death. Seven cases of *disentery* were recorded with 2 deaths. 4 of the cases were amoebic and 3 bacillary infections. Twenty-nine deaths were ascribed to *diarrhoea and enteritis* in the State as a whole.

As regards *helminthic infections* it is said that *ascariasis* is exceedingly common, but that *hookworm* infection is much rarer. All school-children are examined annually for intestinal ova and mass treatment is given as a rule for *Ascari* (see also *School Hygiene* above). Among 1,606 cases of *ascariasis* recorded, 26 were treated as in-patients, while out of 59 persons treated for *ankylostomiasis* 32 were in-patients. At the Laboratory where 2,449 faecal specimens were examined 1,502 gave positive findings. Among the positives 771 contained *Ascari*, 144 *Ancylostoma*, 234 both *Ascari* and *Ancylostoma* ova, 145 *Trichuris* and 7 *E. histolytica*.

Nineteen cases of *pulmonary tuberculosis* were treated in Government Hospitals with 3 deaths but in the State as a whole 18 deaths were ascribed to this cause. Out-patient cases treated for *pulmonary tuberculosis* numbered 29 and for other *respiratory diseases* 1,365. *Bronchitis* caused the death of 2 persons, *pneumonia* 9 and other *respiratory diseases*, 8 during the year.

Genital Diseases.—It is said that while *syphilis* is rare, *gonorrhoea* of a mild type is exceedingly common. Prostatic smears of 50 consecutive male admissions to the Brunei Hospital were taken 18 gave positive findings yet only one of the 18 had visited the Hospital for treatment of *gonorrhoea*. Fourteen in-patient and 32 out-patient cases of *gonorrhoea* are recorded, and 2 in-patient and 109 out-patient cases of *gyna*.

Among *other diseases* it is noted that 3 new cases of *leprosy* were discovered in Kuala Belait—two Chinese and one Indian—all contacts were examined and smears taken with negative results. Among *out patients* 2,561 were treated for *gastro-intestinal ailments* 6,911 for *diseases of the skin* 1,953 for all forms of *violence* 42 for *chickenpox* and one for *tropical typhus*.

Scientific—According to the Laboratory Returns 6,856 specimens of various kinds were examined and reported upon. These included 1,329 blood films, 2,449 faecal specimens, 2,362 specimens of urine and 219 of sputum.

Financial—Total expenditure on Medical Department services during 1937 amounted to \$47,888 a sum which represents 7.3 per cent of the total State expenditure during the same year.

THE STATE OF NORTH BORNEO (1937)

The State of North Borneo occupies with adjacent islands the Northern portion of the Island of Borneo. It lies about 100 miles N.W.N. from Singapore and approximately 120 miles S. of Hong Kong, has a total area of about 31,000 sq. miles, and a coast line of some 900 miles. The territory is under the jurisdiction of the British North Borneo (Chartered) Company; the appointment of the Governor is subject to the approval of the Secretary of State. Headquarters of administration are at Sandakan on the East Coast.

Introductory.—A summary of the Annual Report of the Principal Medical Officer, Dr Percival A. DINGLE, North Borneo appeared for the first time in these pages a year ago (see this *Bulletin* 1938, Supp. pp. 209-13*) when a more comprehensive account than usual was presented describing the scope, responsibilities and activities of the Medical Department concerned. The notes which follow will supply no more than a brief *précis* of the contents of the Report for 1937.

Vital Statistics.—The estimated population at the end of the year was 299,311. The excess of immigration over emigration was 8,469 as compared with the corresponding figure of 3,889 in the preceding year. [Possibly Chinese immigrants owing to the hostilities in China?] Registered births numbered 8,022 and deaths 7,558 giving birth and death rates of 26.8 and 25.2 per 1,000 respectively. Births and deaths are tabulated by sex in five racial groups, but in the absence of similar tabulation of the population it is not possible to compare the specific birth and death rates. Births and deaths are further classified by race and sex for each of 28 Districts and deaths also by Districts in eight age-groups.

Infant deaths numbered 1,298 giving an Infant Mortality Rate of 163.3 per 1,000 live births. These data are also classified with racial distinction—the principal specific rates read Malays 214, Natives of the State 167 and Chinese 151 per 1,000 live births. The principal causes of infant mortality were *diseases of the respiratory system*, *malaria and unspecified fevers* and *diseases of the digestive system*.

The labour force employed on the various *Rubber and Tobacco Estates and Logging Camps* increased from 13,307 on the 1st of January to 18,480 on the 31st of December with an average for the year of 17,189 among these workers 309 deaths were recorded.

Maternity and Child Welfare Work—One certified midwife in Government service is attached to the staff of the Civil Hospital, Sandakan. Two village midwives completed their training at the end of 1936 and were posted to Jesselton and Beaufort respectively for work in neighbouring villages. Two pupil midwives commenced their training in Sandakan in January 1937 and in December were successful in obtaining the certificate granted under the Midwives Ordinance. They were posted to the West Coast for work among native women in the Papar and Membakut districts. Six certified midwives were in private practice in Sandakan.

School Hygiene—In July 60 boys attending the Sandakan Vernacular School were weighed and height and chest measurements taken. To 30 of these boys—all natives of Borneo and of a class who use milk and milk products either very sparingly or not at all in their ordinary diet—a free ration of seven ounces of milk was given daily. The experiment was continued for a month when the average increase in weight of the boys supplied with milk was 2.2 lbs. as compared with an average increase of 0.3 lb. among the controls receiving no milk. During the course of five tours through the Interior and Beaufort Districts, Dr J. C. T. TREGARTHEW examined a large number of natives and among other details records the average splenic enlargements below the costal margin for infants and for children under 16 years of age.

Public Health Sanitation &c.—Anti-malarial measures continued to be carried out along the lines previously described and were extended to include Tawau where the larvae of *A. ludlowi*, *A. umbrosus* and *A. barbipes* were found in swampy land near the township. No mention is made of methods of sewage and refuse disposal, water supplies, etc. and for information on these matters the reader is referred to this Bulletin 1936, Supp. p. 210.

Port Health Work—At Sandakan the principal port of the State 46 vessels entered and 14,918 passengers and crews were examined by the Port Health Officer. The only other port mentioned (see this Bulletin 1936, Supp. p. 211*) is Tawau where 2 vessels entered and 584 passengers and crews were examined.

Hong Kong was declared an infected port on account of cholera between August and November. Deck passengers arriving from Hong Kong were placed under observation at the Quarantine Station (see this Bulletin 1936 Supp. p. 211) and cabin passengers were allowed to land under surveillance. No case of the disease occurred and no infected vessel was reported during the year. In the port of Sandakan 1,576 rats were caught and destroyed. None of the 612 rats examined at the Laboratory was plague-infected.

Hospitals Dispensaries etc.—To the list of Government Medical Institutions described in these pages a year ago (see this Bulletin 1936, Supp. p. 211*) must be added the Sick Rest House established at Sipitang. The records of work dealt with during 1937 at all treatment centres reads as follows:—

Item	5 Civil Hospitals	8 Sick Rest Houses	Other Institutions	Total
In-patients admitted	3 819	1 099	632	5,550
treated	3 944	1 134	817	5 895
Deaths	273	40	31	344
Out patients, new cases	30 400	?	6 100	36 500
treatments	69 784	?	24 372	84 156

Forty nine *Europeans* were admitted and treated in the Civil Hospitals at Sandakan and Jesselton no deaths were recorded.

At the 12 *Government Dispensaries* and 3 *Travelling Dispensaries* new cases treated totalled 146,301 and 3,825 respectively while total treatments carried out at these centres totalled 282,256

Treatment clinics continue to be held at weekly and quarterly intervals at a large number of centres in different parts of the country Dr J. C. T. TREGARTHEN District Surgeon Beaufort and Interior undertook five extended tours during the year visiting Government Dispensaries arranging clinics for the treatment of large numbers of natives at convenient centres along his routes of travel

Two examinations for *Hospital Dressers* for promotion were held during the year For the June examination five Government and three Dressers in private employ sat and seven qualified for promotion in grade Two Government and 4 Dressers in private employ sat for the December examination and 3 qualified for promotion in grade.

The notes which follow briefly summarize the comments of Dr Percival A. DINGLE upon the principal items of 1937 morbidity experience

Of the 1 125 patients admitted to Government Hospitals for *malaria* during the year 497 were admitted to institutions in Sandakan and 14 died 216 to institutions in Jesselton where 7 died and 412 to Sick Rest Houses where 9 deaths were recorded it will be seen that malaria was responsible for 20 per cent of the total cases admitted to all Government Hospitals and approximately 9 per cent of the Hospital deaths due to all causes.

Arrangements have been made at Government Hospitals and Dispensaries for the sale of efficient mosquito nets at cost price 38 nets were sold under this arrangement Treatments for malaria at Government Dispensaries are not quoted but among the findings recorded by Dr Tregarthen (see above) appear the following —

- 8 626 natives examined between Keningau and Bundu Tuhan 93.3 per cent showed enlarged spleens.
- 2 751 Muruts examined *en route* to Pensiangan, 97.2 per cent showed enlarged spleens.
- 822 natives examined in the Tenom district showed spleen index of 86.4 per cent
- 1 010 Muruts examined in the Bokaan country showed splenic index of 92.4 per cent.
- 1 417 natives examined in the Beaufort district spleen enlargement in 91.7 per cent. of cases.

Thirteen cases of *blackwater fever* with 3 deaths were reported the local distribution being Jesselton 4 non fatal Tawau 2 non-fatal Sandakan one fatal Kudat 6 cases two deaths.

Estates—During the year 3 831 estate labourers were admitted to Hospital suffering from malaria and 103 deaths were ascribed to this cause. [It is presumed these patients were admitted to *Estate Hospitals* see above for admissions to Government Hospitals.]

Blood films examined at the 5 Civil Hospitals and at 5 Dispensaries totalled 3 420 and of these 836 or 24·4 per cent were found to contain malaria parasites. Among the positives *P. falciparum* infections were responsible for 28·6 per cent *P. vivax* for 56·3 per cent *P. malariae* for 10·8 per cent and mixed infections 6·3 per cent.

Beriberi was responsible for the admission of 185 cases (16 of which terminated fatally) to Government Hospitals, the local distribution of cases and deaths being Tawau 71 cases 6 deaths Sandakan 64 cases 4 deaths Beaufort 27 cases 2 deaths Jesselton 14 cases 1 death Tenom 6 cases 1 death, and Kudat 3 cases, 2 deaths. It is also stated that 224 estate labourers were admitted to hospitals [non-Government ?] suffering from beriberi and that 7 died.

No case of smallpox appears in the Returns but it is noted that during the year 14 833 vaccinations were performed.

Admissions to Government Hospitals for dysentery totalled 466 and 22 hospital deaths were ascribed to this cause. The principal centres concerned appear to have been Sandakan with 93 cases and 8 deaths Keiungau 97 cases with 8 deaths, and Jesselton 96 cases with 4 deaths. It is also stated that an outbreak of amoebic dysentery occurred in villages in the Kotabeland district 171 cases were reported to have been treated with 34 deaths minor outbreaks also occurred in two other areas. Estate labourers admitted to hospitals [non-Government ?] suffering from dysentery numbered 216 and 20 of these died.

Ninety five cases of pulmonary tuberculosis were admitted to Government Hospitals and 23 hospital deaths were due to this cause. Laboratory examination of 611 specimens of sputum showed 105 positive with *Mycobacterium tuberculosis*. Pneumonia was responsible for 170 cases and 84 deaths while in addition 202 estate labourers received in patient treatment for pneumonia and 72 died.

Helminthiasis—The campaign against *ankylostomiasis* continues along the lines previously described (see this Bulletin 1933, Supp. p. 212*). In Sandakan and Jesselton among the 8,988 persons examined the infection rate was 8·4 per cent. A total of 10,551 treatments among the inhabitants of Sandakan Jesselton and ten other centres of population is recorded during the course of the tours of Dr Tregarthen mass treatment was administered to 11 078 natives, and in other areas treatments were given by the staffs of Government Hospitals and Dispensaries. It is further stated that the mass treatment of labourers was carried out on many estates and 6 621 labourers treated. The Laboratory Report supplies details of the numbers of faecal specimens examined at various centres and findings recorded. Out of 5,593 specimens examined 2,872, or 49·8 per cent contained intestinal parasites of one kind or another. Among the positive findings were *Ancylostoma* ova 14·6 per cent *Ancylostoma* and other helminths 15·1 per cent *Ascaris* alone 32·8 per cent., *Ascaris* and other helminths 7·0 per cent *Trichuris* 6·3 per cent. and *E. histolytica* 20·4 per cent.

To the *Leprosy Settlement* 9 patients were admitted during the year—6 Chinese and 3 Natives of the State. Four patients absconded and

5 died and at the end of the year there remained 69 lepers under treatment distributed as to 47 Chinese 20 Natives of the State and 2 Javanese Treatment continues along the lines previously described (see this *Bulletin* 1938 Supp p 213*) At the Laboratory where 50 nasal and nodular smears were examined 18 were positive with *Mycobacterium leprae*

Veneral Diseases—The V D Clinic at Sandakan continued to function successfully throughout the year with an increase in the numbers of new cases applying for treatment The latter numbered 92 and of these 85 were Chinese 2 were Natives of the State and the remaining 5 were members of other races 352 attendances for treatment were recorded Laboratory examinations of 155 urethral and 168 vaginal smears showed that 118 of the former and 65 of the latter were positive with *N. gonorrhoeae*

As regards *yaws* it is recorded that 6 384 cases were treated during the year these included 6 083 new cases seen during 1937

Scientific—The Laboratory Report contains details of the specimens examined and findings recorded at the five Hospitals and five Dispensary Laboratories The principal items have already been the subject of brief reference in the preceding notes under such headings as *malaria tuberculosis helminthiasis leprosy* and *veneral diseases* The *Report on the Native Health* with special reference to the Sociological and Economic Factors bearing on the Depopulation of the Interior and West Coast North Borneo by Dr J O SHIRCORE (see this *Bulletin* 1938 Supp p 213*) was submitted to Government in December 1936 and published by the Government Printing Office in July 1937

Financial—Total expenditure on Medical Department services during 1937 amounted to \$18,960 (sterling value of the dollar 2s 4d)

HONG KONG (1937)

Hong Kong is one of a number of islands off the south-east coast of China, at the mouth of the Canton River about 91 miles south of Canton and 40 east of Macao Hong Kong is 11 miles long and from 2 to 5 miles wide and has an area of about 32 sq miles It is separated from the mainland of China by the Lyeemoon Pass The peninsula of Kowloon on the mainland, area 2½ sq miles, forms part of the Colony together with the adjacent New Territory The whole Colony has an area of about 345 sq miles.

Introductory—In previous Summaries attention has been drawn to the fact that so often the text of the Report has remained unchanged year after year (see this *Bulletin* 1936 Supp p 197* 1937 Supp p 203* and 1938, Supp p 214*) It is pleasing to note that the Report for 1937 conspicuously avoids the repetitive methods characterizing its predecessors and strikes an original note by introducing appropriate and informative discussion of the outstanding features of public health experience and discriminating commentaries upon the components of public health organization in the Colony for the year under review It is of no little significance to note that instead of requiring a considerable extension of printed matter for the presentation of these welcome features space has been economized with such notable

Estates—During the year 3 631 estate labourers were admitted to Hospital suffering from malaria and 103 deaths were ascribed to this cause. [It is presumed these patients were admitted to *Estate Hospitals* see above for admissions to Government Hospitals.]

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Beriberi was responsible for the admission of 185 cases (16 of which terminated fatally) to Government Hospitals, the local distribution of cases and deaths being, Tawau 71 cases 6 deaths, Sandakan 64 cases, 4 deaths Beaufort 27 cases 2 deaths Jesselton 14 cases 1 death Tenom 6 cases, 1 death and Kudat 3 cases 2 deaths. It is also stated that 224 estate labourers were admitted to hospitals [non-Government?] suffering from beriberi and that 7 died.

No case of smallpox appears in the Returns but it is noted that during the year 14 833 vaccinations were performed.

Admissions to Government Hospitals for dysentery totalled 498 and 22 hospital deaths were ascribed to this cause. The principal centres concerned appear to have been Sandakan with 89 cases and 6 deaths, Keningau 97 cases with 9 deaths, and Jesselton 96 cases with 4 deaths. It is also stated that an outbreak of amoebic dysentery occurred in villages in the Kotabelod district 171 cases were reported to have been treated with 34 deaths. minor outbreaks also occurred in two other areas. Estate labourers admitted to hospitals [non-Government?] suffering from dysentery numbered 216 and 20 of these died.

Ninety-five cases of pulmonary tuberculosis were admitted to Government Hospitals and 23 hospital deaths were due to this cause. Laboratory examination of 611 specimens of sputum showed 105 positive with *Mycobacterium tuberculosis*. Pneumonia was responsible for 170 cases and 84 deaths while in addition 202 estate labourers received in-patient treatment for pneumonia and 72 died.

Helminthiasis—The campaign against *ankylostomiasis* continues along the lines previously described (see this Bulletin 1938 Supp. p. 212*). In Sandakan and Jesselton among the 6 998 persons examined the infection rate was 6·4 per cent. A total of 10 551 treatments among the inhabitants of Sandakan, Jesselton, and ten other centres of population is recorded during the course of the tours of Dr Tregarthen, mass treatment was administered to 11 078 natives and in other areas treatments were given by the staffs of Government Hospitals and Dispensaries. It is further stated that the mass treatment of labourers was carried out on many estates and 8 621 labourers treated. The Laboratory Report supplies details of the numbers of faecal specimens examined at various centres and findings recorded. Out of 5 583 specimens examined 2 872, or 48·6 per cent., contained intestinal parasites of one kind or another. Among the positive findings were *Ancylostoma* ova 14·6 per cent. *Ancylostoma* and other helminths 15·1 per cent. *Ascaris* alone 32·8 per cent. *Ascaris* and other helminths 7·0 per cent. *Trichuris* 6·3 per cent. and *E. histolytica* 20·4 per cent.

To the *Labour Settlement* 8 patients were admitted during the year—6 Chinese and 3 Natives of the State. Four patients absconded and

5 died and at the end of the year there remained 69 lepers under treatment distributed as to 47 Chinese 20 Natives of the State and 2 Javanese. Treatment continues along the lines previously described (see this *Bulletin* 1938 Supp p 213*) At the Laboratory where 50 nasal and nodular smears were examined 18 were positive with *Myco leprae*.

Veneral Diseases—The V D Clinic at Sandakan continued to function successfully throughout the year with an increase in the numbers of new cases applying for treatment. The latter numbered 92 and of these 85 were Chinese 2 were Natives of the State and the remaining 5 were members of other races. 352 attendances for treatment were recorded. Laboratory examinations of 155 urethral and 168 vaginal smears showed that 118 of the former and 65 of the latter were positive with *A. gonorrhoeae*.

As regards *yaws* it is recorded that 6,384 cases were treated during the year these included 6,083 new cases seen during 1937.

Scientific—The Laboratory Report contains details of the specimens examined and findings recorded at the five Hospitals and five Dispensary Laboratories. The principal items have already been the subject of brief reference in the preceding notes under such headings as *malaria tuberculosis helminthiasis leprosy and venereal diseases*. The *Report on the Native Health* with special reference to the Sociological and Economic Factors bearing on the Depopulation of the Interior and West Coast North Borneo by Dr J O SNIRCORE (see this *Bulletin* 1938 Supp p 213*) was submitted to Government in December 1936 and published by the Government Printing Office in July 1937.

Financial—Total expenditure on Medical Department services during 1937 amounted to \$18,960 (sterling value of the dollar 2s. 4d.)

HONG KONG (1937)

Hong Kong is one of a number of islands off the south-east coast of China, at the mouth of the Canton River about 91 miles south of Canton and 40 east of Macao. Hong Kong is 11 miles long and from 2 to 5 miles wide and has an area of about 32 sq miles. It is separated from the mainland of China by the Lyeemoon Pass. The peninsula of Kowloon on the mainland, area 2½ sq miles, forms part of the Colony together with the adjacent New Territory. The whole Colony has an area of about 34½ sq miles.

Introductory—In previous Summaries attention has been drawn to the fact that so often the text of the Report has remained unchanged year after year (see this *Bulletin* 1936, Supp p 197* 1937 Supp. p 203* and 1938 Supp p 214*) It is pleasing to note that the Report for 1937 conspicuously avoids the repetitive methods characterizing its predecessors and strikes an original note by introducing appropriate and informative discussion of the outstanding features of public health experience and discriminating commentaries upon the components of public health organization in the Colony for the year under review. It is of no little significance to note that instead of requiring a considerable extension of printed matter for the presentation of these welcome features, space has been economized with such notable

success that without sacrificing any feature meriting inclusion, by comparison with its immediate predecessor the 1937 Report is a ~~smaller~~ volume by 60 pages, thus representing a saving of about 25 per cent.

Vital Statistics—This section has undergone complete revision. The difficulties attending attempts to make an annual estimate of the Chinese population—difficulties enormously increased for the year under review when a serious refugee problem developed as the result of the Sino-Japanese disturbances—are discussed, together with a brief description of the system applied for the registration of births and deaths. As an example of the importance of the part played by local customs or practices in influencing the interpretation of assembled facts and of the value of explanatory text in such connexion a brief reference to the birth registration among the Chinese population in Hong Kong is of particular interest. It is explained that partly as a result of ignorance or laziness, and partly owing to the Chinese custom of postponing the event until the child is in its second year birth registration is still incomplete.† On the other hand, since the outbreak of Sino-Japanese hostilities the tendency has developed amongst the Chinese to secure registration of births in Hong Kong as a preliminary step towards claiming British nationality even when the evidence of local birth is of the most slender.

The relevant vital statistical data for 1937 may be summarized as follows—

Estimated Populations

Item	Island of Hong Kong	Kowloon and New Kowloon	New Territories	Mantau	Totals for the Colony
Non-Chinese	9,847	10,887	478	1,372	22,584
Chinese	457,982	339,360	107,052	100,000	904,400
Totals	467,829	350,247	107,530	101,372	1,026,978

Births, Deaths, and Infant Deaths.

Item	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
Non-Chinese	682	30.6	244	10.8	30	45.9
Chinese	31,811	22.1	34,391	24.9	11,620	376.0
Totals	32,493	32.1	34,635	34.4	11,650	369.2

† [But it is to be noted that the Chinese method of reckoning age adds a variable number of months to the true age, one year being added at the time of birth and another on the first subsequent Chinese New Year's day so that a child born say in January 1937 is said to be one year old at birth and two years old on the Chinese New Year's day in February 1937 and one born say in March 1937 remains one year old up to New Year's day in February 1938 when it becomes two years old by Chinese reckoning. A formula and tables for converting Chinese ages to their European equivalents are given by STEVENSON and PAN MING TSIU in the Chinese Medical Journal 1929, Vol. 41, pp. 122-130 (1937).]

The registered births include 744 post registrations after 12 months viz 705 Chinese and 39 Non-Chinese these have been deducted when calculating the infant mortality rates. As regards registered deaths the monthly average for the first seven months was 2,349 and for the last five months 3 638. The refugee problem and the typhoon were largely responsible for the increase (see also hereafter under *Public Health*)

European Officials resident in the Colony numbered 940 with an average number resident of 918. Seven were invalided and three died.

In an Appendix to the Report under review the Registrar-General supplies the demographic facts for 1937 in considerable detail.

Maternity and Child Welfare Work—In Hospitals under Government and voluntary control 358 beds were available for maternity cases in 1937 while additional accommodation was also available in a large number of maternity homes of the latter 75 were inspected during the year. At Government Hospitals 4,230 women appear to have been treated for diseases of pregnancy and the puerperal state (with 14 deaths) 3 679 being cases of normal labour. At Chinese Hospitals among 6 439 cases (38 deaths) 6 079 were cases of normal labour. Large numbers of ante-natal and other cases are seen in the out patient departments of the Maternity blocks of the various hospitals and at Government and Chinese Dispensaries.

As from the 1st January 1937 the practice of midwifery habitually and for gain (by unregistered persons) became a punishable offence. "Wan P'os" or handy women who had practised midwifery in Hong Kong for two or more years previously and who enrolled as midwives were exempted from this prohibition. 111 Wan P'os took advantage of the concession and were enrolled. At the examinations of the Midwives Board 37 candidates were successful at the end of the year the names of 395 women were on the Midwives Register. The 16 midwives employed by the Medical Department provide free services at the homes of poor women and children and when not engaged in maternity and child welfare work assist in first aid work at the dispensaries.

Ante natal and infant welfare work continues to be carried out at a large number of centres. Personal hygiene and mothercraft are taught to the women attending these centres.

School Hygiene—The School Hygiene Branch (comprising one European and two Chinese Health Officers a part time Lady Medical Officer and five Nurses) is responsible for the medical supervision of school-children, and the inspection of school premises. With this limited staff responsible for a school population exceeding 86 000 attending over eleven hundred schools it is clear that it is possible to examine only a small proportion of the children. During the year 5 802 medical examinations were carried out in 18 Government schools. [There are 21 Government schools 19 Grant-in Aid schools and 1 137 private schools in the Colony.] Dental defects and visual disorders were the conditions most frequently met with. The establishment of a School Dental Department under the charge of a Government Dental Surgeon is recommended. At the various School Clinics attendances of scholars for examination and treatment totalled 2 780 while in addition 76 visits were paid by School Nurses to the homes of scholars.

At the request of the Education Department a large number of premises being used as schools (presumably as private schools) were inspected and many of them found to lack the elementary amenities demanded for the proper accommodation and instruction of young people. It is hoped to amend existing legislation on the subject of school hygiene to ensure that reasonable standards shall be maintained in all schools, for as the Report rightly observes "It cannot be emphasized too strongly that by far the best method of teaching hygiene to scholars is by ensuring that the school premises themselves are satisfactory from the public health standpoint."

Public Health Sanitation etc—Dr P. S. SELWYX-CLARKE the newly appointed Director of Medical Services, describes the exceptional difficulties with which the public health authorities had to contend, and the unusual factors which combined to influence adversely the health of the community and to give rise to an increased amount of morbidity and mortality during the year under review. The continuance of the Sino-Japanese hostilities and their increasing intensity drove large numbers of refugees to seek a haven in Hong Kong their influx served to aggravate insanitary conditions in the already congested urban area. Refugees from areas in China where health services had become disorganized brought with them the seeds of dangerous infections—dreadful cholera and smallpox epidemics resulted. In September a typhoon of exceptional severity devastated the Colony and while no accurate estimate of the loss of life is possible it may be noted that the bodies of some 490 persons who had been killed or drowned were picked up along the harbour foreshore. Even the most adequately staffed and wisely organized public health service would have found it difficult to maintain essential services and at the same time successfully cope with a series of calamities of this order but in Hong Kong the anomalous arrangements underlying some of the components of public health administration (see this *Bulletin* 1935 Supp. p. 191*) must have served to intensify the problems of efficient control. The whole of the European and Asiatic Sanitary Inspectorate while theoretically grouped round the Health Officers in actual practice are not controlled by Medical Officers of Health but by a layman, the Chairman of the Urban Council of Hong Kong. The present system is unsatisfactory from every point of view—Medical Officers of Health working under these conditions may be likened to Army Officers endeavouring to carry out their complex duties deprived of their C.O.s. A more effectively organized and adequately staffed sanitary inspectorate under the direct control of the Medical Officers of Health would have been able to deal more successfully with such dangerous infections as smallpox and cholera which during 1937 and in recent years have exacted so heavy a toll of life and suffering. Reorganization of the Health Division with the sanitary inspectorate under the direct supervision and control of the Medical Officers of Health is urgently recommended.

Anti-malarial work continued to be carried out under the auspices of the Malaria Bureau with unabated energy in the report of the Malaria Bureau these activities are described in detail.

The objectionable bucket system of *sewage disposal*—which continues to function in the majority of tenements and shop-houses—and local methods applied for the collection and removal of night-soil, are the

subject of description and criticism. The present systems constitute grave sources of danger to the public health and steps are being taken to investigate the possibility of introducing drastic changes which envisage sewer disposal. Methods of *refuse disposal* are discussed and the defects of existing arrangements exposed. The system is capable of improvement and steps are being taken to this end.

The completion of the Shing Mun Jubilee Dam during the year marked a notable stage in the development of public health utilities in the Colony. *Water supplies* are now adequate for the impounding reservoirs (8 on the island and 5 on the mainland) have a combined storage capacity of 5,971 million gallons.

Matters concerned with *housing and town planning* are discussed at some length and various recommendations for future work in this field are outlined. These include new legislation to control town planning etc. and schemes for slum clearance. It may be noted that at present the Sanitary Department (see above) has little or nothing to do with housing other than the removal of obstructions.

During the year special bye laws were drafted restricting the sale of certain *foods and drinks* with a view to minimizing the risks of infection through their use. Draft legislation which sought to make the pasteurization of milk compulsory met with considerable opposition. The proposals will probably become effective in 1938. Much information of value is expected to be made available following the investigations of the *Nutrition Research Committee*.

The curiosities of organization characterizing the Sanitary Department (see above) are seen in another direction. health conditions in markets are under the control of the Colonial Veterinary Surgeons instead of under the Health Officers. Until the reorganization of the Health Division has been carried out and the sanitary inspectorate brought under the supervision and control of Medical Officers of Health, the effective *training of sanitary personnel* cannot be provided for.

Port Health Work—Services continued to function as usual. Due to the Sino-Japanese disturbances a decrease in the number of ships entering the Port is recorded. The principal items of work concerned with shipping during the year may be summarized as follows—

British ocean-going ships entering and clearing	4,322
Foreign	5,202
Other vessels entering and clearing	24,258
Total tonnage dealt with	36 191 724
Emigrants examined	245 488
Emigrants rejected	1 153

Several new *air services* were inaugurated during the year. no cases of infectious disease were discovered in passengers or crews of aircraft. The volume of aerial traffic dealt with during 1937 may be gauged from the following data—

Aircraft	Arrivals	Departures
Crews	398	395
Passengers	1 150	1 133
	1,929	1 756

Hospitals Dispensaries etc—In the words of the Report under review The outstanding event in the year as regards improved hospital facilities was the opening of the Queen Mary Hospital which

replaced the old Government Civil Hospital built in 1874 and which was closed on the 30th of June 1937.

The Queen Mary Hospital, which embodies all the latest improvements in hospital construction and equipment has accommodation for 548 beds, an Isolation Wing consisting of nine small wards accommodates 22 patients. About a quarter of the beds in the new hospital are allotted to the Medical, Surgical, and Gynaecological and Obstetrical clinical units of the Hong Kong University. Private practitioners are privileged to make use of the Maternity Wing for the treatment of their own cases.

The first patients were admitted in May 1937 from the Victoria Hospital, by the end of June all the patients had been transferred to the new hospital from the old Government Civil and Victoria Hospitals.

The returns for Government and Chinese Hospitals are presented in appendices to the Annual Report. For present purposes it must suffice to summarize briefly the record of the year's work by stating that to Government hospitals during 1937 admissions numbered 17,832, cases treated 18,275 and hospital deaths 1,637. Out-patients treated at Government Hospitals exceeded 130,000—these are exclusive of out patients treated at special clinics, dispensaries, etc. At Government Dispensaries alone 59,818 patients were dealt with.

A new and informative account of the origins and subsequent development of the Chinese Hospitals and Public Dispensaries is a feature of the Report under review. Dangerous overcrowding characterizes many of the Chinese hospitals and it is observed, it is not at all uncommon to see two patients, young and old, in the same bed, five adult women in two beds pushed close together, patients lying all over the ward floors so as to render separation of types of disease and medical attention and nursing matters of extreme difficulty. In one case 61 patients were found in a ward of 12 beds! This distressing state of affairs is in urgent need of reform and it is hoped steps may be taken to improve existing conditions in the near future. To the Chinese Hospitals 46,849 patients were admitted, 47,869 were treated and 12,641 died during 1937. The Chinese Public Dispensaries dealt with 264,589 new and 238,527 old cases during the year under review.

Mention has already been made of the fact that owing to exceptional circumstances the public health suffered a set-back during 1937 (see *Public Health* above) and that during the late summer a marked increase in morbidity and mortality experience was noted. As regards the principal diseases responsible for disease and death, the notes which follow briefly summarize the more extensive commentaries provided in the Report under review.

A serious outbreak of cholera occurred. The disease was first recognized in July though it is significantly observed "notifications of dysentery had already shown a marked increase in June." In July 13 cases were reported, in August 1,100 and in September 500 thereafter incidence declined rapidly and only one case was notified in December. Altogether 1,690 persons were affected and 1,082 died. Undoubtedly the epidemic was one of the legacies of the disturbed conditions in China—the infection was probably introduced by refugees from South China. Extensive preventive measures were instituted and energetically applied. Over a quarter of a million inoculations were carried out at hospitals, public dispensaries, and at

centres staffed by the St John Ambulance Association and Brigade. Having regard to the inadequacy and faulty organization of the sanitary staff insanitary methods of night-soil disposal etc. what is surprising is not the sudden development of the epidemic to alarming proportions but the success which followed the application of control and preventive measures in a dangerous situation.

Cases of *smallpox* were notified in Hong Kong during every month of 1937 with the sole exception of October. The largest monthly total was recorded in April though a second and as it proved more serious peak occurred in December. Altogether 129 cases with 94 deaths were notified during the year. Nearly half a million persons were vaccinated and in this connexion it may be noted that 21,232 (or 75 per cent) of the infants registered during the year were vaccinated. The exceptionally high case-mortality rate is suggestive of many missed cases. A more effectively organized sanitary inspectorate would prevent concealment of cases and would lead to the discovery of all contacts.

Though during 1937 *typhus* was rife in many parts of China, no case of the disease was reported in Hong Kong. Sporadic cases of *cerebro-spinal* fever occurred throughout the year with March and April the months of maximum prevalence. Notified cases numbered 157 and 88 of the patients died. No case of *plague* was recorded. The systematic trapping of rats and other anti plague measures continued to be carried out as usual.

Diphtheria was responsible for 308 cases with 148 deaths. maximum incidence occurred in the period November-March. Of the total cases notified 241 were treated in hospitals with 112 deaths. Eight non fatal cases of *scarlet fever* were notified.

Malaria—The anti malarial works carried out under the direction of the Malaria Bureau since its establishment in 1930 have succeeded in making malaria a relatively unimportant disease in urban areas. The infection rate still remains high in some rural areas where anti-malarial activities continue to receive vigilant attention. The Report of the Malaria Bureau describes the year's work in detail. To Government Hospitals 677 cases were admitted and 695 treated with 23 deaths while the corresponding figures for Chinese Hospitals were 1,892 1,931 and 328 respectively. The distribution of types of infection among the 695 cases in Government and the 1,931 cases in Chinese Hospitals reads as follows —

	Benign Tertian	Quartan	Subtertian	Cachexia	Undefined
Government Hospitals	206	8	309	121	51
Chinese ..	286	7	1 053	47	506

At the Government Bacteriological Institute 8,917 blood films were examined for the presence of malarial parasites and in 3,581 cases positive findings were recorded. In the Report of the Bacteriological Institute a graph is interleaved showing the percentage relation of the different types of malarial parasites to each other month by month.

throughout the year and also the rainfall in inches (see also this *Bulletin* 1938 Supp. p. 217*)

July to October were the months of maximum incidence of fevers of the *enterica* group during the year 464 cases with 178 deaths were reported. Government Hospitals dealt with 84 in-patient cases of typhoid and 6 of paratyphoid with 20 deaths and Chinese Hospitals with 211 cases of typhoid with 106 deaths. At the Bacteriological Institute where 1 539 samples of serum were tested for the specific agglutinins of the enteric bacilli, 344 were positive with *Bact. typhosum* 6 *Bact. paratyphosum A* 3 *Bact. paratyphosum B* and 62 type undetermined. The investigation into the presence of agglutinins against typhoid organisms in cases showing no clinical signs of the disease was continued (see this *Bulletin* 1938 Supp., p. 219*)

Preceding the cholera epidemic a significant rise in the reported cases of dysentery was observed (see above *Cholera*). During the year 576 cases were notified (see below) and according to the Report of the Registrar-General 316 deaths were ascribed to the disease. According to the Hospital returns the majority of the cases were bacillary infections, viz. —

	Amoebic	Bacillary	Undefined	Total	Total deaths
Government Hospitals	3	117	4	14	16
Chinese "	165	328	237	728	234

At the Bacteriological Institute where 3 753 faecal specimens were cultured for pathogenic organisms 134 were *Bact. dysenteriae* Flexner 11 Shiga and 17 Schmitz infections.

Tuberculosis was responsible for one in every eleven deaths due to all causes. Cases treated in hospitals may be summarized as follows —

	Government Hospitals		Chinese Hospitals	
	Cases	Deaths	Cases	Deaths
Pulmonary tuberculosis	195	61	3 853	1 898
Other forms	122	48	753	29

Overcrowded living conditions and under-nourishment coupled with the exceedingly common habit among the Chinese of spitting in public places combine to spread the disease. Hospitalization of any but a very small proportion of the infectious patients is at present not possible. At the Bacteriological Institute 174 out of 687 specimens of sputum examined were positive with *Mycob. tuberculosis*.

The number of patients treated in Government and Chinese Hospitals, for various helminthic infections was negligible totalling 317. Among 101 cases in Government Hospitals were 40 cases of ascariasis and 35 of ankylostomiasis while among 216 cases dealt with in Chinese Hospitals, 102 were treated for ascariasis and 44 for ankylostomiasis. Thirty-five patients were treated for clonorchiasis (8 in Government Hospitals). Among 2,407 faecal specimens examined at the

Bacteriological Institute 170 contained ascari 104 clonorchis 42 trichuris 31 ancylostoma and 89 were multiple infections. Little is known of the amount of leprosy in Hong Kong (see this *Bulletin* 1937 Supp p 209*) and until a systematic survey is carried out the situation so far as this disease is concerned must remain conjectural. The question of obtaining the help of the British Empire Leprosy Relief Association to carry out such a survey is under consideration. Out of 154 specimens of nasal and skin smears examined at the Bacteriological Institute 50 were positive with *Mycobacterium leprae*. The facilities for free medical advice and treatment remained as previously described. Details of the year's work at six centres may be summarized as follows —

Centre	New Cases		Attendances	
	M	F	M	F
Queen's Road (Old Govt. Civil Hospital)	1 241	570		
Violet Peel Health Centre	1 345	657	5 838	2 621
South Howloon (Docks)	2 228	481	7 648	2 375
Howloon Hospital	347	834	10 453	2 280
Taiipo Dispensary	28	2	1 752	3 201
Un Long Dispensary	21	5	391	15
			171	23

In patients treated at Government Hospitals for syphilis numbered 127 for soft chancre 112 and for gonococcal infections 207 at Chinese Hospitals the corresponding figures were 234 30 and 62 respectively. At the Bacteriological Institute an interesting comparative study was carried out on the recently described *Ide precipitation test* for syphilis. One thousand sera were tested in parallel with the Kahn test and the following results recorded —

	Kahn test	Ide test
Strong positive	214	243
Positive	133	141
Doubtful	44	51
Negative	609	565
Total	1 000	1 000

Kahn tests were applied to 16,581 samples of blood serum 4 345 gave positive 723 doubtful and 11 513 negative reactions. In addition 617 smears were examined for the presence of the gonococcus but findings do not appear to have been recorded.

Other Diseases — Under this heading mention should be made of the fact that deaths due to diseases of the respiratory system occupied the first place in the list of causes of death and were responsible for 10,380 deaths during the year under review. Beriberi including the infantile variety constitutes a serious problem and no fewer than 1 661 deaths were ascribed to this cause in 1937. In the Table below the cases and deaths recorded in hospitals for certain respiratory affections and for beriberi are summarized.

PACIFIC OCEAN

Fiji and Western Pacific (1937)

The Colony of Fiji comprises some 200 to 250 islands of volcanic origin in the south Pacific Ocean (many merely uninhabited islets and rocks) lying between 15 and 22°S latitude and longitudes 177°W and 175°E. Sydney is about 1700 miles distant and Auckland 1100 miles. The Tongan or Friendly Islands lie 180 miles to the south-east and Samoa 500 miles to the north-east. The principal inhabited islands are Vitilevu with an area of 4 053 sq miles, Vannalevu 2,130 sq miles, Tavunui 217, Kadavu 124, Koro 58, Gau 45, Ovalau 43, Rotumah 14 sq miles. The total area of the Colony is 7 083 sq miles (nearly that of Wales).

Introduction—This Report compiled by Dr V W T McGUSTY, Acting Director of Medical Services, contains a considerable amount of new and interesting information under such headings as *Administration of Public Health Hospitals Medical Education of Native Races* etc relating to the Colony of Fiji. The summary notes which follow do not pretend to deal adequately with the extensive discussions of the above matters which should be considered by the reader *in toto*.

Vital Statistics—The relevant facts may be tabulated as follows—

Race	Estimated Population	Registered Births	Birth Rate	Registered Deaths	Death Rate	Infant Deaths	I.M.R.
Europeans	4,238	71	16.8	36	8.5	1	—
Half-castes	4,756	150	31.5	40	8.4	8	53.3
Fijians	99,595	3,432	34.5	2,128	21.4	331	96.4
Rotumans	2,915	129	44.3	58	19.9	10	77.5
East Indians	89,333	3,357	37.6	801	10.1	187	55.7
Polynesians	1,567	74	47.2	42	26.6	2	27.0
Chinese	1,837	18	9.8	6	3.3	—	—
Others	1,156	53	45.9	14	12.1	4	—
Totals	205,397	7,284	35.5	3,225	15.7	543	74.8

European Officials resident numbered 429 with an average number resident of 336. Five were invalided and two died. Of *Non European Officials* there were 626 resident with an average number resident of 516. One death occurred within this group.

Maternity and Child Welfare Work—The Obstetric Ward of the Colonial Hospital was well patronized as usual. 252 cases were admitted and 219 deliveries recorded. A new Ward is to be built to meet steadily increasing demands. The number of patients attending the *Ante Natal Clinic* steadily increased during the year under review. 85 mothers made 231 attendances for advice and treatment. A *Post Natal Clinic* was started in May and the 16 mothers attending included the wives of the two principal Chiefs.

Native Obstetric Nurses are trained at the Colonial War Memorial Hospital. Government has decided to establish a school with improved facilities for the training of non European women in general and obstetric nursing.

Fijian Infant Welfare work has up to the present been carried out by intelligent native women appointed by the Chiefs of villages to carry out the daily routine services under the supervision of inspecting medical officers assisted by 4 specially trained European Nurses. In 1938 control of this work will pass from the Native Administration to the Medical Department one important result of this change will be that the special staff of infant welfare nurses will be controlled by the Nursing Superintendent.

School Hygiene—All schools throughout the Colony were inspected by District Medical Officers, or Native or Indian Medical Practitioners. Those in the actual Suva urban and rural areas are the special charge of the Medical Officer of Health in these areas a hookworm survey was commenced in August faecal specimens were collected from school-children and examined, treatments being given to the children infested. The following facts are supplied relating to this survey—

Race	Number Examined	Positives	Percentage Infestation
Indians	131	59	45
Fijians	785	285	34
Others	65	6	11

Public Health Sanitation etc—In Fiji Public Health Administration demands the maintenance of two distinct health organizations, in view of the fact that one half of the population consists of communally living natives and the other half of individual groups of immigrants with East Indians predominating. The large majority of native *Fijians* continue to live in tribal units in small scattered villages each under its headman tribal affinities have led to the grouping of villages into larger administrative units and each of these is subject to the authority of a single Chief. These populations are served by Native Medical Practitioners who are posted to the various native areas. On the other hand, the public health staff of the non-native sections of the community comprises one full-time Medical Officer of Health whose direct authority is limited to the port and environs of Suva and medical officers who are *ex-officio* Medical Officers of Health, posted to rural areas, qualified sanitary inspectors, sanitary overseers, and sanitary assistants. All health and curative activities in the Colony are centrally controlled by the Director of Medical Services.

In order to ensure better supervision of the *Sanitary Services* in the town of Suva arrangements were made during the year whereby the Government Medical Officer of Health assumed control of the Town Board Sanitary personnel, and this Officer will in future direct all public health activities in the urban and sanitary areas of Suva. In the Suva rural area a number of new *latrines* were constructed and *septic tanks* installed.

The usual routine sanitary inspections of premises were carried out during the year these are described in detail in the Report under review.

Port Health Work—The Port Health Officer reports that during the year 155 overseas vessels were boarded and 3,323 passengers and 3,802 members of crews medically examined. Vessels arriving from plague

infected or suspected ports from malarial ports vessels not holding deratization or deratization exemption certificates etc. are fumigated by the Port Sanitary Staff 10 overseas and 69 local vessels were dealt with Rat-catching activities were continued 2 604 rats were caught and 600 were bacteriologically examined at the Government Laboratory but all were negative for *P. pestis*

Hospitals, Dispensaries etc.—A very full description is provided of the Hospitals in the Colony It is stated that in Fiji there are no privately owned hospitals [In this connexion there is mention of one hospital owned by the Colonial Sugar Refining Company and one by the Methodist Mission] and with the exception of 13 private Medical Practitioners all medical activities are centred in the Government Curative services extend from the hospitals to the *dispensaries* the latter being under District Medical Officers Native and Indian Medical Practitioners Details of the volume of work dealt with at the various hospitals during 1937 are set out in the following Tables —

Hospital	Admissions	Deaths	Out patients
Colonial War Memorial	2 679	190	18 212
Lautoka	2 601	121	7 129
Lambasa	711	35	9 153
Levuka	323	14	3 467
Provincial Hospitals, etc.	3 717	207	52 553
Central Leper	80	27	—
Mental	45	11	—
Suva Gaol	66	—	300

Native Medical Practitioners in charge of dispensaries treated 44 150 cases and recorded 315 deaths among their patients.

The *Nurses Training School* established in 1934 has served to provide the Colony with trained nurses experienced in local conditions. The expansion of nursing services which is rapidly taking place has led to the decision to replace this School by another in which non Europeans will be trained as nurses to a standard adequate for the purposes of the subordinate nursing posts of the Colony

Medical Education is described in detail in the Report of the Principal of the *Central Medical School* (Dr D W HOODLESS) In addition two unusually interesting articles originally prepared for submission to the Rural Hygiene Conference held in Java in August 1937 have been reprinted with the permission of the Health Section of the League of Nations and are presented in the Annual Report under review The articles are entitled "*The Medical Education of Natives*" by Dr D W HOODLESS and "*The Central Medical School in Suva in Relation to the Health Problems of the Pacific*" by Dr V W T MCGURRY It is impossible in these pages to summarize with adequate justice the contents of these two important articles which deserve the very fullest consideration but attention is especially directed to the concluding observations of Dr MCGURRY's paper which read as follows —

None of the administrations participating in the native medical practitioner scheme could afford to embark on expensive medical services but, by a pooling of resources in the Central Medical School undertaking it is believed they will be able to elaborate a common form of health

organization that will meet the requirements of their native populations. The system is still in an experimental stage in most places but the success that has been obtained in Fiji justifies the hope that the results will prove favourable in other places.

"While the scheme was evolved to meet the special circumstances of communally-living South Sea islanders, experience with the individualistic Indians, although less successful, has also proved it capable of modification to meet other conditions.

Its main essentials are economy and the maintenance of the native medical practitioners as closely as possible at the economic level of the people amongst whom they work, and these considerations are liable to be overlooked by over-enthusiastic supporters, as well as by destructive critics.

(See also this *Bulletin* 1938 Vol 33 pp 828-833)

The following notes briefly refer to the principal items of morbidity experience commented upon in the Annual Report for 1937.

Sporadic cases of clinical *diphtheria* make their appearance from time to time—nine cases were notified but fortunately the degree of virulence was low.

Influenza was very prevalent throughout the Colony and during the year 1784 cases were reported—the disease was mild in type and few cases developed serious complications. Of *measles* 180 cases were reported from country districts.

Dysentery was prevalent during the first quarter of the year and altogether 1,213 cases of bacillary and 24 cases of amoebic dysentery were notified with 67 deaths. The highest incidences recorded were in the Rewa, Nadi, Savu Savu, Suva and Ba districts. At the Laboratory where 734 faecal specimens were examined, 124 were positive with Shiga bacillus 19 Flexner 10 Shultz, 9 Sonne while the protozoon *E. histolytica* was found in 8 cases. Reported cases of *enteric fever* numbered 210.

Tuberculosis is said to be one of the three most widespread communicable diseases endemic in the Colony (the other two being dysentery and enteric fever). During the year 342 cases of the pulmonary and 51 cases of other forms of the disease were notified. A Tuberculosis Survey of the whole population is urgently advised by the Medical Department. Among other compulsorily notifiable diseases recorded during 1937 appear 223 cases of *broncho-pneumonia* and 69 of *lobar pneumonia*.

In the section *School Hygiene* above reference was made to the *hookworm* survey of school-children. The Laboratory Report mentions the examination of 1,948 specimens of stools, and of these 853 were positive with hookworm, 146 Trichuris, 58 Ascaris, and 40 Enterobitis.

Leprosy—The usual comprehensive and useful account of the year's work at the Government Leper Station Makogai, is presented, the 1937 Report being contributed by Dr W. G. MACNAUGHTON who assumed duty as Medical Superintendent when Dr C. J. AUSTIN proceeded on leave at the middle of the year. During the year 60 lepers were admitted, 27 died, 31 were discharged, leaving at the end of the year 577 patients still in residence.

Under the Public Health Ordinance 1935 venereal diseases were made notifiable and treatment compulsory. Syphilis is said to be rarely seen except among the crews of vessels calling at the port of Suva and gonorrhoea appears to be the only venereal disease met with

among the resident population. During the year 340 cases of venereal disease (undifferentiated) were notified. According to the Returns of the Provincial Hospitals 41 cases of syphilis and 109 of gonorrhoea were treated in those institutions during 1937.

Cases of yaws continue to be met with in country districts but the scarring and deformity due to tertiary yaws formerly seen are unknown among the younger generation. Notified cases during the year numbered 4581.

Other diseases calling for brief mention include the following. Twelve cases of *epidemic dropsy* were reported from Ba and two from Suva all occurred among Indians. An Indian woman from the rural district of Suva was admitted to hospital suffering from *undulant fever* the source of infection was traced to the milk of a cow. An Indian case of *cerebrospinal meningitis* was reported and one Fijian case of *cerebral meningitis*. The first case of *Landry's paralysis* to be reported occurred in an Indian adult from Lantoka district. Congenital *skin diseases* particularly *ringworm* and *scabies* are common in Fijian native communities.

Dr S. M. LAMBERT contributes an *Annual Report on the Western Pacific Health Service*. The sanitation campaign was confined to the island of Vita Levu and during the course of the work a large number of homes were surveyed, holes bored, squatting slabs supplied, etc. A tuberculosis and general health survey was carried out in one of the mountain provinces. 3141 persons were tuberculin tested and 1,803 gave positive reactions. Among the whole population surveyed 5 primary, 6 secondary, and 12 cases of tertiary *yaws* were recorded.

Scientific—The work of the Pathological Laboratory is described by Dr D. C. M. MACPIERSON, Government Pathologist. During the year 5731 specimens were examined—the principal of these have been mentioned in the preceding notes. In several cases while the numbers of examinations are given no findings are recorded. Owing to the demands made by routine work and teaching the present staff can spare little time to engage in special research work. In these circumstances it is the intention of Government to place all hospital and laboratory resources of the Medical Department at the disposal of adequately trained research workers who wish to carry out original investigations and steps have been taken to make these decisions known to the incumbents of research scholarships and fellowships in Great Britain, Australia and New Zealand.

Financial—During the year under review expenditure on Medical Services amounted to £84,422 a sum which represents 7.5 per cent of the total revenue of the Colony during the same year.

British Solomon Islands Protectorate (1937)

The British Solomon Islands Protectorate is situated between the parallels of 5°S and 12°30'S., and the meridians of 153 and 170° of E. longitude. It consists of Guadalcanal, Malaita, San Cristoval, New Georgia, Yasabel and other islands east of New Guinea with a total area of about 11 453 sq. miles.

Vital Statistics—The population of the Protectorate in round numbers "remains unchanged, viz Europeans 500 Asiatics 200 and Natives 94 000. Records of births and deaths are not maintained in all Districts, and even where attempts are made to register vital facts, the data for a specific year may be grossly inaccurate for owing to various local circumstances, declarations may not be made until the year following the occurrence of such events as births and deaths. The Report observes "There are no statistics from Santa Cruz, the Eastern Solomon Islands, Malaita, Choiseul, or the Shortland Islands

It is much to be regretted that no figures are available for Malaita the most densely populated of all the group" [In this connexion it is appropriate that mention should be made of the admirable efforts made by the Resident Commissioner Mr F A ASHLEY and of Mr C. N. F. BRACOTT, an Assistant District Officer to secure population and other vital records in these Islands. For some years these enterprising Officers have laboured unceasingly to assemble precise details concerning the populations in Malaita (see this *Bulletin* 1933 Supp. p. 225*) and in the Shortland Islands.] The Protectorate is divided into 8 administrative areas but the Report under review supplies the births and deaths for only 4 Districts, the totals being births 802 deaths 688

Births and deaths records of non-natives are of little value (see this *Bulletin* 1933 Supp. p. 225*) European births numbered 3 and deaths 6 and there were 6 Asiatic births recorded.

European Officials resident numbered 39 with an average number resident of 29 No deaths or invalidings were recorded during 1937

The *labour population* numbered 3 607 and within this group 40 deaths were recorded 19 of the deaths were due to *pneumonia* and 4 to *malaria*

Public Health Sanitation etc—From the health point of view the year was unfavourable mainly on account of the prevalence of respiratory affections which persisted throughout the year Influenza and influenzal colds were always present, the *pneumonias* and other complications were frequent and were responsible for many deaths. Routine *anti malarial* work continued to be carried out and included the weekly oiling and spraying of areas, the routine inspection of houses tanks, gutterings, etc As regards methods of *sewage disposal* the newer residences on Tulagi (the Headquarters of the Resident Commissioner) are equipped with flushing toilets, and either septic tanks or drains discharging into the sea Elsewhere pan latrines are general, while for the use of natives, latrines are built over the sea. *Water supplies* remain unchanged (see this *Bulletin* 1933 Supp. p. 226*) *Plantation labourers* suffered from the prevalent influenza. A new ration scale was approved and will become effective in April, 1938 It is expected that *beriberi* will completely disappear as the result of the adoption of a more generous and properly balanced dietary

Training of Medical and Sanitary Personnel—Four students were under training as Native Medical Practitioners at the Central Medical School Suva Fiji one candidate completed the course and graduated in December 1937 Two natives were trained as *village dressers* at the Tulagi Hospital during the year

Port Health Work—No case of quarantinable disease was reported at any of the three ports of entry During the year 74 vessels entered and 71 cleared from these ports

Hospitals Dispensaries etc—Tabata Hospital on Isabel Island was closed down during the year and Gizo Hospital brought into operation in March The record of work dealt with at hospitals in the Protectorate reads as follows—

Hospital	In patients			Out patients
	Admitted	Treated	Died	
Tulagi	47	49		Averaged 17 daily 3 607 1 439 1,515 —
Europeans	28	29		
Asiatics	625	663	4	
Natives	124	138	20	
Natives only	249	266	6	
Auki	69	69	6	
Aola	2	10	2	
Gizo			1	
Lunatic Asylum				

Of the two *Mission Hospitals* on Malaita one was closed down during the year The Melanesian Mission Hospital at Fauabu continued to do excellent work A new hospital is in course of erection on the island of Kolombangara in the Gizo District by the Seventh Day Adventist Mission. Smaller hospitals in charge of trained nurses have been opened two by the Marist Mission and one by the Melanesian Mission Drugs and surgical supplies were issued by the Medical Department to Mission authorities to the value of £1 108.

Malaria is endemic throughout the Islands no abnormal features call for comment The only details of cases treated are contained in the returns of the Tulagi Hospital viz 14 European 14 Asiatic and 29 Native cases of malaria with 2 deaths (natives) and two non fatal Asiatic cases of *blackwater fever*

Influenza and influenzal colds were a feature of public health experience throughout the year outbreaks which scarcely affect the non native population produce really serious effects among the natives and are the cause of many deaths (see this *Bulletin* 1938 Supp p 226*-227*) At the Tulagi Hospital 155 native and 3 European cases were dealt with none proved fatal

Tuberculosis remains a serious public health problem—made more difficult because patients are unwilling to remain in hospital if they believe they are not improving and because they fail to carry out precautionary measures in their houses and thus spread the infection The returns of the Tulagi Hospital show 20 cases of tuberculosis (all *forms*) and of these 14 were of the *pulmonary* type of the disease even of the latter were native cases The returns also show 22 cases of *pneumonia* with 5 deaths.

BRIT SOLOMON ISLANDS— 228*
GILBERT & ELLICE ISLANDS (1937)

Eight non-fatal cases of *dysentery* (bacillary) were treated in Tulagi Hospital, 6 of *enteritis* and 5 cases of other digestive ailments.

The work of the *yaws* and *hookworm* unit was in abeyance during the greater part of the year (see this *Bulletin* 1938 Supp. p. 227*) but treatments were carried on as usual at Government Stations and by Native Medical Practitioners and drugs were also supplied to Missionaries qualified to give injections, as in past years. At the Tulagi Hospital 64 in-patient cases of *yaws* were treated.

A *leprosy* survey of the Protectorate is in progress conducted by the expert leprologist Dr. James Ross INNES (see this *Bulletin* 1938 vol. 35 p. 882). The work commenced following the arrival of Dr. Innes in August and up to the end of the year three areas had been surveyed—no details are so far available.

General diseases—No case of *syphilis* is mentioned, and the disease is said not to exist among the native population. 20 cases of *gonorrhoea* (all natives) were treated in the Tulagi Hospital.

Scientific—Dr. H. B. HATHERINGTON, Senior Medical Officer mentions the following *special reports* submitted to the Resident Commissioner during the year—

- 1 Survey of State of Nutrition in the British Solomon Islands Protectorate
- 2 Report on Health Organisation and Rural Hygiene in the British Solomon Islands Protectorate
- 3 Report on the Development of Women's Education in the British Solomon Islands Protectorate and their employment in Health Work
- 4 Report on Maternity and Child Welfare in the British Solomon Islands Protectorate

Financial—Total expenditure on Medical and Sanitary Services for the financial year 1936-37 amounted to £9,445 a sum which represented 15 per cent of the Revenue of the Protectorate during the same period.

GILBERT and ELLICE Islands Colony (1937)

These islands, formerly a Protectorate, were annexed to the Empire in November 1915. The Gilbert group lies between 4°N and 3°S. latitude and 172° and 177°E longitude and consists of 16 islands, with several small dependent islets. The Ellice Group, between 8° and 10½°S latitude and 176°E and 179-58°W longitude, comprises 9 islands. Ocean Island (Pagan) is the seat of Government and was proclaimed British in 1900. Fanning Island and, to the north-west of it, Washington Island were included in the Colony in 1916 and Christmas Island in 1919.

Vital Statistics—The following Table has been compiled from the Returns supplied by the various Native Government Scribes—

Race	Population (end of year)	Births	Birth Rate	Deaths	Death Rate	Infant Deaths
Europeans	224	4	18.0	—	—	—
Gilbert Islanders	27,278	1,075	39.1	615	23.2	129
Ellice Islanders	4,283	153	37.1	75	18.2	21
Banabans	679	32	45.5	18	25.6	11
Asiatics	821	2	1.2	3	3.4	—
"Floating Natives"	3,156	?	?	?	?	?
Totals	38,439	1,266	37.3	711	21.0	161

The above birth and death rates are as published in the Report under review but *all would appear to be incorrectly calculated* (see this *Bulletin* 1936 Supp. p. 213* 1937 Supp. p. 219* and 1938 Supp. p. 229*) The correct rates for the different groups appear to be as follows —

Items	Europeans	Gilbert Islanders	Ellice Islanders	Banabans	Asiatics
Birth Rates	18.0	39.4	35.7	47.1	2.4
Death Rates	—	22.5	17.5	26.5	3.6

Maternity and Child Welfare Work—No actual work is reported under this heading. The appointment of a European Matron to the Tarawa Central Hospital was approved when this post is filled steps will be taken to establish a training school for native nurses.

Public Health Sanitation etc—It was generally supposed that the Native Regulations as administered by the Local Native Authorities were sufficient to preserve reasonably decent sanitary conditions throughout the Colony. However the results of village inspections in two islands have exploded this belief and it is possible that the unsatisfactory conditions noted in the two islands are by no means exceptional. Latrines are built on piles over reefs but in many cases such latrines are high and dry except at times of high tide and being near the villages excreta becomes freely exposed to flies. A promising experiment with a modified type of reef latrine is in progress, but it is added that the complete lack of hygienic consciousness among the natives tends to baulk efforts directed towards improving sanitation in the islands. In most islands *water supplies* are obtained from shallow surface wells which are usually unprotected and liable to contamination in two islands rain water is collected into cisterns and used (see this *Bulletin* 1938 Supp. p. 229*).

Port Health Work—Thirteen vessels entered the port of Tarawa during the year one vessel arriving from Hong Kong was quarantined for cholera. At Ocean Island 88 ships entered and were granted pratique.

Hospitals Dispensaries etc—In the absence of information to the contrary it is presumed the numbers and distribution of established hospitals etc remain as previously described (see this *Bulletin* 1938 Supp. p. 229*). During the year the whole position of hospital and dispensary services was thoroughly investigated and it was decided to replace the present unsatisfactory Tarawa Hospital with a larger

modern and fully equipped building and also to provide each island hospital with a dispensary built of imported material to replace the present dusty and often dark little huts used as such. These dispensaries will be erected by personnel of the Medical Department in an attempt to enable the general native community to obtain maximum benefit from the services of the Medical Practitioners while travelling duty when this was possible during the year. They were thus enabled to move from island to island and advise Native Dressers in regard to sanitary matters and the care of hospital patients. Under the arrangement clinical surveys of eight islands having a total population of 15,082 were carried out.

The only details supplied of hospital work are the following —

Hospital	In patients	Deaths	Out patients
Tarawa Central	268	17	4,973
Ocean Island	1,487	78	5,879
Banaban	121	17	483
District (including Funafuti)	441	282	67,101

The Laper is/wm Tarawa was unused until March 1937 (see this Bulletin 1938 Supp. p. 231) when 19 lepers were admitted. Two patients died. It is anticipated that the remainder will be transferred to Malakal Fip.

To the Luvale is/wm Tarawa 4 patients were admitted and 16 were under treatment during the year. Three deaths were recorded, all of them due to dysentery.

Owing to the limited nature of the training of Native Medical Dressers no enumeration of diseases in respect of island hospitals is attempted. The notes which follow briefly refer to some of the principal diseases treated during the year.

The health of the community in general showed no unusual features during the year under review. Several epidemics of influenza were reported among the various islands though none was of particular note. At the British Phosphate Commissioners Hospital, Ocean Island, 7 European and 81 Natives were treated, and at the Tarawa Hospital 9 cases with 1 death were recorded.

As returns in the Report refer to three Hospitals only it will serve the purposes of the present Summary if the principal ailments treated are classified in the following manner —

Disease	Tarawa Hospital	Ocean Island British Phosphate Commissioners Hospital	Banaban Hospital
Dysentery	13	76	23
Diarrhoea and Enteritis	8	179	13
Beriberi	1	48	7
Other deficiency diseases	0	17	—
Rheumatism	1	136	17
Pulmonary Tuberculosis	3	70	4
Bronchitis	—	34	4
Other respiratory diseases	4	47	22
Septic sores	0	264	6
Acroderitis	5	177	5

Tuberculosis—Under this heading it is stated that all forms of tuberculosis though particularly glandular tubercle appear to have shown some increase.

Yaws has shown a definite increase during the year. Native Medical Practitioners and Native Medical Dressers administered 11 044 injections of N A B among a total population of 31 102.

Hookworm is pretty general among the Ellice Islanders. The Native Medical Practitioner stationed in the Islands has trained Dressers in the administration of remedies.

Veneral diseases—It is stated that *sypilis* is unknown but that *gonorrhoea* appears to be increasing.

An investigation to determine the incidence of *filariasis* in the Gilbert Islands was undertaken during the year and continues. The disease is general in the Ellice Islands.

In an *Appendix to the Report* under review Dr T SCHLICHT, Government Medical Officer and Medical Officer to the British Phosphate Commissioners contributes an Annual Medical and Sanitary Report for Ocean Island. The population numbered 2,678 the native birth rate was 33.8 the native death rate 24.6 per 1 000 and the mortality rate for the community as a whole 19.1 per 1 000.

The sanitation of the Island is said to be satisfactory. Salt water *sewerage* is in use in European houses; automatic flush latrines in the British Phosphate Commissioners labourers' locations; *kaustine* systems in the Police lines and prisons and cement slab pits in the Banaban villages. The principal ailments treated in the two Ocean Island Hospitals have been quoted in the Table above. It is stated that *tuberculosis* is not widespread but is very fatal. 14 out of the 55 deaths recorded during the year in the Island were due to this disease. *Yaws* is not common and no cases of *veneral diseases* occurred amongst the inhabitants. *Financial*—No details are supplied.

WEST ATLANTIC

BAHAMAS (1937)

The Bahamas are a chain of coral islands lying between 21°42' and 27°34' N. latitude and 72°40' and 78°5' W. longitude and are the most northerly of the British West Indian Colonies, with the coast of Florida to the north-west and Haiti to the south-east. There are about a score of inhabited islands, of which New Providence is the chief and contains the capital, Nassau. The total area of the archipelago is 4,404 sq. miles, or about half that of Wales.

ital Statistics—The estimated population for 1937 was 68,908. Registered births numbered 2,189 and deaths 1,019; the resulting crude birth and death rates are said to be 36.8 and 17.0 respectively per 1,000 population. On the basis of a population of 68,908 the rates should be for births 32.7 and for deaths 15.2 per 1,000. [In the previous issue of this *Supplement* attention was called to the calculation of these rates for the year 1936.]

It is also noted that live births in New Providence are said to have numbered 676 and in all other islands of the Bahamas 1,428 making a total of 2,104. This figure does not agree with the 2,189 births mentioned above—even if the 105 stillbirths are included agreement is not reached.

Infant deaths are said to have numbered 443 so the infant mortality rate for the whole Colony would be 210.5 per 1,000 live births—for New Providence the rate reads 143 and for all other Bahama Islands 242 per 1,000 live births.

Maternity and Child Welfare Work—An ante-natal clinic was inaugurated as a part of the Out-patients Department of the Bahamas General Hospital; no details are supplied. The ante-natal clinic operated by Roman Catholic Sisters and attended by a private practitioner Dr. M. M. HARR continued to do much useful work. 684 attendances were recorded during the year. Of 676 maternity cases registered in New Providence 396 were delivered at the Bahamas General Hospital. The Infant Welfare section of the Health Department is under the supervision of a specially qualified nurse who contributes a detailed report of the year's work. Three clinics per week are held in the City District and one per month in the Fox Hill District; all clinics were well attended. During the year 1,062 new cases were registered, 10,480 attendances for treatment or advice recorded, and 5,365 home visits paid. During the last three months of their training nurses are attached to the Infant Welfare section to gain practical experience of the work. The course of the training in midwifery has been extended to one year so that midwives in training may spend three months with the Infant Welfare Section.

Provision has been made to subsidize 12 qualified midwives for service in the Out Islands. Eight of these appointments were filled during the year.

School Hygiene—Little information is supplied. The Infant Welfare nurse gave a series of lectures in the senior schools on personal hygiene. Periodic inspection of the Industrial School was carried out by the Assistant Medical Officer who reports that after each visit a persistent gain in weight was noted in the majority of the boys.

Thirty four boys were referred to the Bahamas General Hospital Laboratory for kalin tests three reacted positively and were given appropriate treatment

Public Health Sanitation etc—The health of the Colony remained satisfactory throughout the year. In Nassau a campaign to eradicate mosquito breeding was inaugurated with successful results. Additional connections to the *sewerage systems* were carried out (see this *Bulletin* 1938 Supp. p. 233*). The services concerned with *scavenging* and the *collection and disposal of refuse* functioned satisfactorily as a result of the greater vigilance of Sanitary Inspectors a large increase in the amount of garbage collected is noted. An additional 158 houses were connected up to the chlorinated city *water supply* weekly tests drawn from all districts showed that bacteriologically the water maintains a high standard. A survey of *housing conditions* and sanitation in the slum areas was undertaken and has resulted in the demolition of a number of buildings and a reduction of overcrowding. *Dairies foodshops etc* continued to be inspected at regular intervals no foodshop may now operate without a certificate of the Sanitary Department testifying that the premises comply with the prescribed Sanitary Regulations. Further investigation into the problems of *nutrition and malnutrition* were undertaken by the Chief Medical Officer Dr J. M. CRUIKSHANK (see this *Bulletin* 1938 Supp. p. 234*) and recommendations were made by him with a view to improving existing conditions throughout the Colony. A comprehensive report was submitted to the Welfare Committee suggesting profitable lines of study of nutritional problems for the ensuing year.

The Chief Medical Officer delivered a series of radio broadcasts on the prevention of various diseases which are or may be encountered in the Colony. The Chief Sanitary Inspector contributes his usual annual report of the work of his Department work concerned with the inspection of dairies foodshops housing etc. is described in some detail.

Port Health Work—The Port Officer examines Bills of Health and in cases of doubt a Medical Officer is summoned before a ship is granted pratique. No diseases of a quarantinable nature were reported 749 vessels and 241 aeroplanes were dealt with during the year.

Hospitals Dispensaries etc—The numbers and distribution of patients treated at the various medical institutions during 1937 as given in the Report under review read as follows—

Institution	Admitted	Treated	Died
Alexandra Hospital	2 736	2,822	217
Victoria Jubilee Infirmary	125	200	42
Lazaretto	3	18	1
Mental Hospital	73	132	17
Private Patients Buildings	113	114	6
Totals	3 050	3,286	283

The Report of the Superintendent Bahamas General Hospital states that 3 099 patients were admitted during the year and that 318 hospital deaths were recorded but in the tabulated Returns of this

Hospital admissions are given as 2,259 and deaths 234 [In this connexion see also this Bulletin 1938 Supp., p 234*]

Out-patients treated at the Bahamas General Hospital numbered 15,434 and total treatments (attendances) 33,988. Separate reports on the work of the Out-patients Department and X-Ray Department are appended.

The *training of First Aid Dressers* is carried out at the Bahamas General Hospital. The *Nurses Training Course* has been extended to four years (see this Bulletin 1938 Supp. p 234).

As regards diseases treated during the year it is noted that no case of *malaria*, *dysentery*, *smallpox* or *diphtheria* was recorded.

Eleven cases of *typhoid* and one case of *paratyphoid fever* were reported with two deaths ascribed to the former. Improved water supplies and sanitation plus mass inoculation are combining to reduce the incidence of the disease. *Dysentery* does not appear to be mentioned in the text of the Report but Hospital Returns show 35 cases, distributed as to 30 amoebic, 3 bacillary and 2 unclassified. Two deaths were assigned to the amoebic type of infection, one to bacillary dysentery and one to undefined type.

Of *tuberculosis* (all forms) it is said that 92 cases were admitted to the Bahamas General Hospital with 43 deaths. In another section it is stated that 61 cases of *pulmonary tuberculosis* were admitted. On the other hand the classified returns of the Bahamas General Hospital supply the following data—

Items	Admitted	Treated	Deaths
Pulmonary Tuberculosis	16	71	37
Other forms of T.B.	29	99	6
Totals	35	91	43

Other *respiratory affections* treated during the year include 47 cases of *bronchitis* with one death, and 38 cases of *pneumonia* with 12 deaths.

Pellagra again figures amongst the deficiency diseases treated. 21 patients were admitted, 25 treated and 2 died.

Under the heading *Helminthic Diseases* it is again stated that "Ascaris, oxiurus and trichurus infections are frequently seen. Hospital Returns show 16 cases of ascariasis.

On page 7 of the Report it is stated that two cases of *leprosy* were admitted to the Lazaretto but Hospital Returns record three such admissions. "Alepo" intravenously continues to be the method of treatment.

All the venereal diseases occur—*syphilis*, *gonorrhoea* and *chlamydia* but with great frequency, *chancre* less frequently, and *granuloma venereum* rarely. During the year a survey of the incidence of *syphilis* was undertaken and routine Kahn tests applied to all Hospital admissions with the exception of private patients. Of the 1,621 tests carried out 25.2 per cent. reacted positively. At the V.D. Clinic 783 patients were treated for *syphilis*, 240 for *gonorrhoea*, and 105 for *granuloma venereum*. At the Bahamas General Hospital among

in patients were 189 cases of syphilis 20 soft chancre 43 of gonorrhoea and 7 of granuloma venereum
Scientific—The Report on the year's work at the Government Bacteriological Laboratory is contributed by Dr L. W. FITZMAURICE. The greater part is devoted to details of work concerned with the Venereal Diseases Clinic (see above)
Financial—Expenditure on Medical and Sanitary services during 1937 amounted to £28,965 of which £16,663 were Hospital expenditures

BARBADOS (1937-38)

Barbados the most easterly of the West India Islands is situated in latitude 13° 4' N and longitude 59° 37' W. Its length is 21 miles, its breadth 14 and it has an area about 168 sq miles a little larger than that of the Isle of Wight

General—Dr J. D. ALLEN continued in charge as Acting Chief Medical Officer until Dr B. V. WASE BAILEY assumes his duties as Chief Medical Officer at the end of the current year. No changes of importance in the sanitary organization of the Island are reported and the unsatisfactory arrangements previously described continue (see this Bulletin 1934 Supp p 172* and 1935 Supp pp 212*-213*)
Vital Statistics—For the year ended December 31st 1937 the population of the Island was estimated to number 190,939. Registered births numbered 5,670 and deaths 3,511 the resulting crude birth and death rates being 29.7 and 18.4 per 1,000 inhabitants respectively. Infant deaths numbered 1,228 giving an infant mortality rate of 21.7 per 1,000 registered births. Causes of death are classified by a nomenclature of 85 titles and by sex for each of the eleven parishes and again by the same nomenclature in 14 age-groups. These classifications occupy no less than ten double pages of this small Report of 25 pages.
Maternity and Child Welfare Work—A property adjacent to the General Hospital has been purchased by the Hospital Board with the intention of converting the building into a Maternity ward for hospital cases and an ante-natal clinic

The Infant Welfare Clinic conducted by the Baby Welfare League (see this Bulletin 1938 Supp p 236*) continued to function with excellent results. During the year 385 new babies were entered on the Clinic registers. At the end of the year 472 women were registered under the provisions of the *Midwives and Nurses Registration Act 1921* as midwives only 73 as nurses only and 178 in both capacities. In the classified causes of death the deaths of 48 women were recorded as due to diseases of pregnancy

School Hygiene—Many new buildings have been erected and the sanitary condition of many of the old schools has been improved. The medical inspection of school-children continues results suggest that the services of a dental officer are necessary. The daily distribution of milk and biscuits to the children continues. The Government Industrial Schools (one for boys and one for girls) were satisfactorily managed and the sanitary condition of both institutions is said to be good. No outbreak of epidemic disease was reported and cases of

Illness recorded were of a minor character. Pupils and staffs were given T.A.B. inoculation during the year.

Public Health Sanitation etc.—No important changes in the organization of the public health services of the Island are recorded (see this *Bulletin* 1935 Supp. p. 214* and subsequent issues). The usual Health Week Meetings were held—Lantern lectures and demonstrations were a great success. Lectures on sanitation and health are also given at intervals in different districts by the Sanitation Officer and are well attended.

Port Health Work—In a special Appendix more space is devoted to describing the work of the Port Health Officer than is given in the Report to discussing the sanitation and sanitary administration of the Island as a whole. During the year 142 vessels entered and were boarded by Port Health Officers. 164 were arrivals from ports infected or suspected of being infected with quarantinable diseases. Quarantine measures were enforced against certain territories in the Caribbean Sea and in South America. Passengers arriving for Barbados numbered 9,848 of these 8,237 were medically inspected and 83 placed under surveillance—the majority of them from Venezuela. The trapping and poisoning of rats was continued. 228 rats were bacteriologically examined, all gave negative findings for *P. pestis*.

Hospitals etc.—In general the provision for the care and maintenance of the sick continues along lines previously described (see this *Bulletin* 1935 Supp. pp. 212*-213*). No data are supplied of the cases treated in the General Hospital.

At the *Mental Hospital* 612 patients were in residence at the end of March 1938. Twenty single rooms have been added and 20 are being erected. This additional accommodation will greatly relieve the overcrowding referred to in earlier reports.

At the *Leper Hospital* there were 71 inmates at the beginning of the year. 2 new admissions, 3 re-admissions, 2 discharges and 8 deaths were recorded during the year.

Patients treated in the *Prison Hospital* numbered 179.

The Board of Health Inspectors continued a rigorous search for anopheline mosquitoes. For the past 8 years the Island has been free from malaria.

Of *enteric fever* 138 cases were notified and 34 deaths were ascribed to this cause in the Island as a whole. Energetic steps are taken to discover sources of infection and all contacts are given prophylactic treatment. The Report observes "There has been no diminution in the incidence of *dysentery*, *diarrhoea* or *enteritis* but no statement is appended showing the numbers of cases of these diseases treated. The classified mortality returns show 33 deaths due to *dysentery* and 438 due to *diarrhoea* and *enteritis*—of the latter 406 deaths occurred in the 0-5 age-group.

Notified cases of *tuberculosis* numbered 89 and deaths due to this cause in the Island totalled 277 of the latter 214 were ascribed to the pulmonary form of the disease. Tuberculosis Hospitals have been erected in the parishes of St. Michael and Christ Church.

Seventeen cases of *acute poliomyelitis* were notified during the year these were mild in character and only one death was recorded. There were 12 cases of *diphtheria* with 4 deaths.

Veneral Diseases — During the year under review the *I D Clinic* at the General Hospital was made available for the treatment of in patients. Cases dealt with among in patients and out patients were as follows —

Item	New Cases	Old Cases	Gross attendances
Syphilis	1 008	920	11 580
Gonorrhoea	925	487	16 403
Other V D	43	23	310

In addition to *causes of death* mentioned in the preceding notes other important causes of mortality mentioned in the classified returns include the following *diseases of early infancy* 378 deaths *pneumonia* 250 *nephritis* 244 *cancer and other tumours* 140 and *bronchitis* 100 deaths.

It is said that Government maintain a well equipped and well conducted *Bacteriological Laboratory*. No details are supplied but it is observed the work continues to increase.

Financial — The references to expenditure include the following — *Mental Hospital* £14,291 *Lepor Hospital* £2,582 *Parochial Expenditure on Sanitation* £15,365 and expenditure on *Parochial Poor Law Administration* £43,282.

BERMUDA (1937)

The Bermudas or Somers Islands form a cluster of some 300 small islands in the Western Atlantic in latitude 32 15' N and longitude 64 51' W. The nearest mainland is Cape Hatteras in North Carolina, 530 miles distant. Most of the islands are mere rocks and less than a score are inhabited. The total area is estimated at 19 square miles.

Vital Statistics — The relevant facts may be classified as follows —

Item	Estimated Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I.M.R.
Population—							
White	12,143	211	17.3	117	9.6	11	52.1†
Coloured	18,508	505	26.8	212	11.3	41	81.1
Totals	30,651	716	23.1	329	10.6	52	72.6†

† In the Report these rates are given as 49.3 and 71.4 per 1 000 live births respectively.

The Report contains an interesting commentary upon the longevity experience of the Colony. Since 1866 there have been 29 centenarians in a total of just over 28 000 deaths and of the 28 no fewer than 22 were coloured women. 14 of them dying before 1900. Even allowing for possible inaccuracies in statements of age at death the figures suggest unusual endurance amongst coloured women. The Report

concludes. In these days of studious dietetics there is occasion for us to pause over the survival of these old women, who born into slavery and surviving the lean years of the American Revolution existed on their fish, rice potatoes and rye bread to the greatest age our records show or are likely to show.

Maternity and Child Welfare Work—The 9 District Nurses and 1 relief nurse of the Bermuda Welfare Society paid 1,560 ante-natal visits and attended 268 maternity cases to these figures must be added 2,567 visits to the Baby Clinics (see this *Bulletin* 1933 Supp p 238*). The nurse of the Hamilton Parish Nursing Association made 3,228 home and clinic visits and attended 34 maternity cases.

The Public Health Act provides for instruction in contraception (see this *Bulletin* 1933 Supp p 238*). During the year six meetings were held to launch the idea of birth control and were well attended.

School Hygiene—Dr J P SWEENEY examined 700 school-children in the western parishes. He reports fewer cases of scabies and impetigo than in former years, but more of *pediculosis capitis*. In the Central parishes 811 white and 1,157 coloured children were examined for the first time. Lack of cleanliness was observed. Extensive dental work was undertaken over 600 children were given dental treatment, but the percentages for non-attendance for and refusals to undergo treatments were high. Dr Sweeney immunized 100 children in the Western parishes against diphtheria. Opposition was experienced in both the western and central areas against immunization. Dr W E TALBOT reported that 15 per cent. of the children of West Indian parents attending the Central School showed umbilical hernia. The condition was not seen elsewhere.

Public Health Sanitation etc—Dr H WILLIAMS contributes a brief survey of progress characterizing Public Health work in Bermuda during the past eight years. The control of flies and mosquitoes is being seriously attempted. Swampy areas are being reclaimed by the dumping of rubbish and steel drums are being supplied to the public for use as incinerators. Methods of sewage disposal remain as previously described (see this *Bulletin* 1933 Supp p 239). At St. George's a well was sunk to supplement supplies for the flushing of toilets in the Queen Street area. Proposals to clear St. George's of its sanitary antiquities overhanging the waterfront were repelled by the Corporation. The revised Public Health Act which became effective on the 1st of February 1938 provides for a more adequate storage of water and limits the capacity of a dwelling for human occupation to the quantity of water available to keep those occupants clean. By encouragement and competition great improvement in the condition of dairies and milk supplies is reported. Dr J C COOPER, Government Veterinary Officer, tuberculin-tested 1,769 dairy cattle and found 42 reactors. In the Central District 916 cattle were tested for contagious abortion when 60 showed definite and 109 slight infection. In the Western District where 62 cattle were examined, the corresponding findings were 7 and 25 respectively. The inspection of grocery stores and of locally killed meat was continued. It may be noted that the Public Health Act provides for the periodic examination of all persons employed in handling the food and drink of others and of all servants employed in any restaurant, hotel, guest or boarding-house."

A classified return of the numbers and nature of sanitary inspections carried out under the provision of the Public Health Act is supplied.

Port Health Work—The information supplied relates to the arrival of 83,092 passengers of the total 731 arrived by air.

Hospitals Dispensaries etc—The *Bermuda Collage Hospital Nursing Home* (see this *Bulletin* 1938 Supp. p. 239*) received a grant of £1,500 from the Treasury. The 150 patients treated included 5 maternity cases. Nurses paid 58 visits to homes during the course of the year. Considerable extensions are being made to the *King Edward VII Memorial Hospital*. No admissions to the *Isolation Hospital* were recorded during 1937.

Weekly clinics were maintained at two centres by Dr. J. P. Sweeney and by Dr. W. H. C. MASTERS at three centres during the year.

Dr. Wilkinson observes that the chronic ailments of the circulatory system and kidneys preponderate in the Colony. In the classified returns 83 deaths were ascribed to diseases of the circulatory system and 25 to diseases of the genito-urinary system (24 of these to nephritis alone).

For the first time in a long while the fear of communicable disease has shaken the equanimity of this Colony. This observation doubtless refers to the 7 cases of anterior poliomyelitis notified—the first case occurring in one of the cadets on board H.M.S. *Trobisher*. Dr. W. Lloyd Aycock of the Harvard Medical School and Chief of the Commission on Poliomyelitis in Massachusetts investigated the sporadic cases following the first case notified.

Of the 12 cases of tuberculosis (all forms) recorded 11 were of the pulmonary type of the disease. 9 deaths were ascribed to pulmonary tuberculosis and one to other forms of tuberculosis during the year under review. The Tuberculosis Pavilion has not yet progressed beyond a plan (see this *Bulletin* 1938 Supp. p. 240*) owing to the fact that extensions to the main hospital must first be completed.

A ship from South America had one case of smallpox on board. No other cases were reported. During the year 503 vaccinations were performed. Conscientious objectors numbered 155.

Other communicable diseases notified included 39 cases of scarlet fever, 35 of chickenpox, 24 of measles and 24 of German measles and two of typhoid fever. No deaths were assigned to any of these titles. It is noted that 24 deaths were assigned to cancer and 3 to other tumours.

The Venereal Diseases Clinic at the Hospital continued to function one afternoon each week with an average attendance of about ten. Drs. Sweeney and Masters also maintained clinics in their districts and Dr. Masters attended gaol prisoners who were in need of treatment. The Public Health Act will give the Board of Health some control of those who habitually spread venereal diseases.

Financial—Expenditure on Medical and Health Department services amounted to £14,588 and on the Isolation Hospital £1,884. These sums in the aggregate represent 3.6 per cent. of the total expenditure or 3.5 per cent. of the revenue of the Colony during the year under review.

BRITISH GUIANA (1937)

British Guiana the only British Colony on the mainland of the South American Continent, lies on the north-eastern coast. Its seaboard, about 270 miles extends almost from the eastern mouth of the River Orinoco to the River Courantyne, and has to the north the Atlantic Ocean to the south and south-west Brazil, to the east Dutch Guiana and to the north-west Venezuela. Its area is approximately 89 44 square miles (a little more than England, Scotland and Wales together). Its capital is Georgetown, the next most important town being New Amsterdam, about 60 miles east of Georgetown.

Vital Statistics—The welcome and informative feature introduced in the Annual Report for 1935 under the title of *Comments on Vital Statistics* is continued in the Report under review. The relevant facts are classified in great detail for each Registration District in the Colony but for present purposes the following summary must suffice—

Item	Estimated Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	I M I
The Colony	337 039	11,227	33.3	7,367	21.9	1,359	1.1
Georgetown—							
Municipal Area	64,200	1,801	28.0	1,302	20.3	—	109
Registration Area	67 448	2,103	31.3	1,396	20.7	217	103
New Amsterdam	9 650	338	35.0	210	21.8	33	104

The average population of the *Maturum Diamond Fields* was 3,993. Births registered (all being aboriginal Indians) numbered 5 and deaths 36. No population figures are given for the *Sugar Estates* though on these properties 2,379 births and 1,343 deaths were registered, while the infant mortality rate for 1937 is stated to have been 111.3.

Maternity and Child Welfare Work—Details of the year's work carried out in the maternity wards of the five principal hospitals in the Colony can be summarized as follows—

Hospital	Bed Accommodation	Deliveries	† Births	Maternal Deaths
Georgetown	46	1 064	927	36
New Amsterdam	8	227	203	11
Soddu	1	73	67	6
Maharuma	2	32	31	—
Bartica	9	16	13	—

† Presumably live births.

The activities of the *Infant Welfare and Maternity League* were maintained throughout the Colony. League nurses attended 2,445 confinements and recorded 2,358 live births during the year. Clinics were conducted by Government Medical Officers and in remote areas by Government Dispensers at 60 centres (see this *Bulletin* 1937 Supp. pp. 230*–231*). At these centres 1,090 clinics were held during the year and 4 416 infants and 1 676 expectant mothers were

treated. In accordance with usual practice the League received the financial support of Government from these funds were subsidized seven health visitors and 41 nurse midwives stationed in the more populous centres of the Colony and in remote river and creek areas. A further sum of money part of the total contributions to the King George V Silver Jubilee Fund was handed over to the League to be expended on as many couch-cabinets as possible to be distributed to the various clinics throughout the Colony. The training of midwives continues (see *Hospitals* below).

Maternity and child welfare work continues to make good progress on the *Sugar Estates*. Clinics are conducted by Government and Estate Medical Officers nurses and midwives. 22 Estate Hospitals are now provided with maternity wards.

School Hygiene—References which can be assigned to this heading mainly relate to the dental treatment of school-children. Dental clinics were conducted in Georgetown and New Amsterdam. It is said the School Dental Scheme continues to be highly appreciated both by pupils and parents. In 1938 an experimental scheme of milk distribution to selected groups of school-children is to be inaugurated. In a short report on the Industrial School Onderneeming (average number of boys 77) it is stated the general health of the boys was satisfactory sanitary arrangements were satisfactory and sanitation was well maintained.

Public Health Sanitation etc—The Report under review on the health and sanitary conditions of British Guiana for 1937 is dated "1st of March 1939" and submitted by Dr A. J. MACLENNAN who succeeded Dr J. A. HENDERSON as Surgeon-General. [This title was changed to that of *Director of Medical Services* by Ordinance No 11 of 1938.] Dr Henderson left the Colony in June 1937 and thenceforward to the end of the year Dr B. A. V. WASE BAILEY Government Medical Officer of Health acted as Surgeon-General.

With regard to *anti malarial measures* it is reported that the bonification of the Thomas Lands (see this *Bulletin* 1936 Supp p 226* and 1937 Supp p 233*) was continued. Special emphasis is laid upon the importance of adequate drainage along the coast-lands of the Colony in connexion with the prevention of malaria. In the absence of specific descriptions it is assumed that methods of *sewage and refuse disposal* remain as previously described. Efforts are continuously made to improve the sanitary conditions in all areas and the classified returns of the work carried out by District Sanitary Officers indicate that a large number of new latrines were erected (see this *Bulletin* 1937 Supp p 231*). The only references to *water supplies* appear to relate to improvements completed on *Sugar Estates* to available supplies to the Leprosy Hospital and to water examinations carried out at the Government and Health Department Laboratories.

There was no change during the year in the arrangements for the medical and sanitary care of *Sugar Estates* (see also *Scientific* below) and *Mining Properties* (see this *Bulletin* 1937 Supp p 231*-232*).

The routine inspections of premises concerned with the manufacture and sale of *foods and drinks* were continued, and the question of *milk supplies* received special attention. The great difficulty in the control of supplies lies in the absence of large farms where milk production is the primary object and the presence of a very large number of

small producers. The *Report of the Nutrition Committee* was published as Sessional Paper No 3 of 1937. It discusses such matters as soil, water and food products, analysis of foodstuffs, racial and dietetic habits, educational and economic aspects of nutritional problems, etc.

The Central Board of Health devotes special attention to housing and the proper laying out of land for building purposes. Progress is reported, particularly in the County of Berbice where conditions were notably unsatisfactory. Special reference is made to the patience and assiduity of *District Sanitary Inspectors*. Details of the work carried out by these Officers are presented in an Appendix.

Port Health Work.—Quarantine was permanently maintained during the year against all South and Central American Ports (except British, French and Dutch) against New Orleans, Mobile and Tampa (U.S.A.) for a specified period and against ships arriving from certain ports in the Caribbean Sea to ensure the notification of the occurrence of quarantinable diseases. During the year the Port Sanitary Inspector paid 490 visits to 204 steamers and 553 visits to 298 sailing vessels, while the Port Health Officer visited 139 vessels and placed 63 passengers under surveillance for smallpox. Plague precautions were enforced upon vessels lying alongside wharves and the trapping and examination of rats was continued. Only 4 rats were trapped during the year, none was infected with *P. pestis*.

Hospitals, Dispensaries, etc.—Considerable space is devoted to describing the year's work at the various Government Institutions and in addition to extensive textual commentaries, the relevant facts are set out in great detail. For the seven Public Hospitals in the Colony the data relating to in-patients, hospital deaths, and out-patients are tabulated for each hospital according to a disease nomenclature of 205 titles—some of these having several sub-divisions. [This extensive classification appears to be unnecessary for the purpose of an Annual Report and is rather wasteful of time and money necessary for preparation, and cost of printing. It is suggested that the special Colonial nomenclature of 65 titles would meet ordinary requirements.] As regards other institutions the information supplied is equally comprehensive. For purposes of convenience the relevant data are summarized below:—

Institution	In-patients treated	Hospital Deaths	Out-patients
<i>Public Hospitals—</i>			
Georgetown	13,830	1,214	32,862
New Amsterdam	3,230	268	13,899
Saddis	2,017	186	4,618
Berbice	627	62	3,199
Labaruma	514	46	1,591
Kamukma	45	1	1,078
Potaro	19	3	627
Totals	20,298	1,796	57,797
<i>Other Institution</i>			
Mental Hospital	823	97	Remaining at end of year 707
Alms House	141	234	856
Three Prisons	109	—	?

In addition to the Out patient departments of the seven Public Hospitals there is a Government Public Dispensary in Georgetown and 13 Government Dispensaries in the charge of qualified sick nurses and dispensers established in remote yet populous river districts and in the mining areas. At these 14 Dispensaries 42 354 patients were treated during the year and of these 30,356 were new cases.

So far as *Hinterland Settlements* are concerned special arrangements suited to local conditions are made to provide the inhabitants with medical aid. Free medicines are supplied to a number of *Aboriginal Indian Stations* the personnel of *Mission Stations* are particularly successful in dealing with the inhabitants of these areas. Periodical visits are paid by the Government Medical Officer Skeldon to a settlement up the Courantyne River (along the borders of Dutch Guiana). For the medical aid of residents in the Rupununi area (a remote district in the south west of the Colony bordering Brazil) a Government dispensary was established at Kurupukarra in September 1937 in charge of a dispenser. This man acts also as primary school teacher, cattle-trail clerk, and during school holidays is expected to make first aid tours to the settlements in the area!

The training of nurses is carried out at the Government hospitals in Georgetown, New Amsterdam and Suddie. At the Nurses examination held in June 1937 nineteen nurses sat for the First Professional and 26 for the Final examination. 13 of the former and 22 of the latter were successful. Out of 32 pupil midwives who sat for the Midwifery examination 20 were successful.

Hospitals and dispensaries are maintained on 23 (out of 31 plantations) *Sugar Estates*. Hospital in patients numbered 24 235, hospital deaths 851, and 6 331 patients were treated at the dispensaries.

A hospital of 8 beds is established at the headquarters station of the *Malarami Diamond Fields*; a dispensary is attached to this hospital and another at an out-station.

The textual comments upon the incidence and distribution of disease in the Colony are mainly based upon the returns of hospitals and dispensaries.

Malaria remains the Colony's most important disease and is responsible for about 750 deaths each year. During 1937 registered deaths ascribed to this cause numbered 755 and in addition there were 327 deaths due to *undefined fevers*. Hospital in patients treated for malaria numbered 2 169 and of these 125 died; there were also 9,312 out patients treated for the disease. Eight in patient cases of *Blackwater fever* with 2 deaths were reported. Types of infection were as follows:—

Type of infection	In-patients	Deaths	Out patients
Benign tertian	150	4	220
Quartan	1	—	—
Subtertian	64	10	11
Chronic malaria	248	17	732
Unclassified	1 708	94	8 349
Blackwater fever	8	2	—

At the Government Laboratory 1,053 blood films were examined and the following positive findings recorded *P. vivax* 154 *P. falciparum* 48, *P. malariae* 2.

In *Sugar Estate Hospitals* 10 419 cases of malaria were treated with 142 deaths. Malaria is also the chief cause of disability in Mining areas on the Mazaruni Diamond Fields 7 deaths were ascribed to the disease.

Filaria (and filarial bubo) gave rise to 281 in-patient cases and 12 hospital deaths and in addition there were 602 out patient cases of filariasis and 5 of filarial bubo. Deaths in the Colony ascribed to filariasis numbered 32. As regards *elephantiasis* there were 21 in patients and 22 out patients treated for this condition no deaths were ascribed to this cause.

Of *enteric fever* 329 cases were notified with 65 deaths. Cases treated as hospital in-patients numbered 254 (253 typhoid 1 paratyphoid A) with 42 deaths. At the Laboratory 328 Widal examinations were made the positive findings recorded were *Bact. typhosum* 107 *Bact. paratyphosum A* and *B* each 11 and *Bact. paratyphosum C* 6. In addition to the Widal tests, 549 faecal specimens were cultured and *Bact. typhosum* isolated in 60 cases.

In patient cases of *dysentery* numbered 129 distributed as to 46 amoebic 4 bacillary and 79 unclassified. In addition there were 134 out patients. Total deaths in the Colony ascribed to dysentery numbered 113 and of these 23 occurred in hospitals. At the Laboratory *E. histolytica* was found in 18 of 797 specimens of faeces examined while in the course of cultural examination of 140 faecal specimens *Bact. dysenteriae* Flexner was identified in two cases. *Diarrhoea and enteritis* caused the deaths of 369 persons in the Colony during 1937 and 67 of these deaths occurred in hospitals. in-patients treated for diarrhoea, enteritis, and colitis numbered 407 and out patients 699.

Notified cases of *tuberculosis* (all forms) numbered 325 and 298 deaths were ascribed to this cause in the Colony as a whole. It is noted that of 530 hospital in-patient cases dealt with of which 197 terminated fatally 502 of the hospital cases and 182 of the hospital deaths were due to the *pulmonary* form of the disease. At the Laboratory 736 specimens of sputum were examined and 191 were positive with *Mycobacterium tuberculosis*. The site for the new Tuberculosis Hospital has been prepared and building operations are to commence. Meanwhile the British Guiana Society for the Prevention and Treatment of Tuberculosis continued its activities as in former years.

Other respiratory affections treated at hospitals, etc., included the following —

Disease	In-patients	Deaths	Out patients
Bronchitis	584	40	3,911
Broncho-pneumonia	73	47	9
Pneumonia	246	140	32

Askylostomiasis appears to be the most common helminthic infection. Hospital in-patients treated for this condition numbered 83 (2 deaths) and out-patients 80. In patients treated for *ascariasis* numbered 13 and out-patients 96. At the Government Laboratory 797 faecal

specimens were microscopically examined and the following positive findings recorded —

Ova of *Ancylostoma* in 149 of *Ascaris* in 29 of *Trichuris* in 14, of *Enterobius* in 1

Leprosy — In accordance with usual practice extracts from the annual report of Dr F G ROSE Medical Superintendent of the Leprosy Hospital are presented. It is not always easy to follow the numerical statements presented with reference to Leprosy in British Guiana. In one statement it is said 46 patients were admitted to the Leprosy Hospital during 1937 (14 being former out patients). Again of 635 cases of leprosy known to the authorities and believed to be alive it is said 392 were inmates of the Leprosy Hospital. But at the beginning of the year there were 374 inmates 46 were admitted (or 32—see above) apart from 82 re admissions according to a tabular statement which also announces that there remain 375 lepers still in residence at the end of the year. Among these 375 patients were 18 Europeans 104 East Indians 6 Chinese 187 Black and 60 persons of mixed descent.

Veneral Diseases — The V D Clinic at the Public Hospital Georgetown continued to extend its activities during the year while in the Public Hospitals of New Amsterdam and Suddie and to a lesser extent in Bartica limited provision for such work has been made. It is hoped to provide a scheme which will embrace the villages and plantations throughout the Colony and permit the appointment of a whole-time Assistant V D Officer for the organization and control of clinics in outlying areas.

The Report under review supplies a comprehensive account of the year's work and numerous tabulated statements relating to numbers of patients with distinction of sex and age in conjunction with the type of venereal disease. These statements may be summarized to read as follows —

Disease	Government Treatment Centres		Treated on Sugar Estates	
	In patients	Out patients (new cases)†	In patients	Out patients (new cases)†
Syphilis	559	1 002	67	104
Gonococcal infections	646	1 376	104	74
Granuloma Venereum	83	49	2	1
Soft Chancres	89	63	3	5

† In the 1937 issue of this Supplement out patient attendances were recorded.

Extracts of some length are presented from the annual report of Dr E G H PAYNE Medical Officer in charge of the V D Clinic Georgetown.

At the Laboratory out of a total of 14 480 specimens dealt with Wassermann reactions totalled 6 460 and of these 1 656 gave positive findings. In addition 2,333 smears were examined for gonococci but findings are not recorded.

Eleven in-patient and 22 out patient cases of yaws were treated during the year under review

Among other diseases referred to in the Report the following call for brief mention. The *Report of the Ophthalmic Department* states that 388 in-patients and 5 068 out patients were treated for eye diseases, but the returns relating to the seven Public Hospitals show that 607 in-patients and 2,871 out patients were treated for affections of the organs of vision. Nephritis caused the deaths of 628 persons in the Colony in 1937 for this disease 558 in patients (111 deaths) and 574 out-patients were treated in Public Hospitals. For cancer 150 persons were treated as hospital in-patients and 42 died, while in the Colony as a whole the deaths of 147 persons were ascribed to this cause.

[The nomenclature used for the classification of diseases treated in hospitals remains unchanged though considerably out of date for comparable purposes see this *Bulletin* 1937 Supp. p. 235*.]

Scientific—The Annual Report of the Government Laboratory describes the number and nature of the specimens received reference has been made to many of these findings in the preceding notes.

The outstanding public health effort in 1937 was the establishment of a Central Medical Research Laboratory which was opened in Georgetown during August by certain of the Sugar Producers in the Colony. This Laboratory is under the direction of Dr G. GIGLIOLI (see this *Bulletin* 1936 Supp. p. 228*) who will investigate medical and sanitary problems peculiar to plantations and which adversely affect their resident populations. The experience derived from this venture will undoubtedly prove of value to the health of the Colony at large.

Financial—Total expenditure on Medical and Health Services during 1937 amounted to \$554 000 a sum which represents 8.4 per cent. of the total revenue of the Colony during the same year.

BRITISH HONDURAS (1937)

British Honduras is on the east coast of Central America, with Yucatan (Mexico) on the north and north-west and Guatemala on the west and south and on the east the Bay of Honduras (Caribbean Sea). It has an area of about 8,598 sq. miles, i.e. about the size of Wales.

Vital Statistics—The relevant facts for each of the six Districts and for the Colony as a whole are presented as follows—

District	Estimated Population	Births	Birth Rate	Deaths	Death Rate	Infant Deaths	1 M R.
Belize	22 015	750	34.0	418	18.9	94	125.3
Corozal	8 199	261	31.8	181	22.0	49	167.7
Orange Walk	6,153†	183	29.0	117	17.9	20	109.2
Stann Creek	6,349	176	27.7	77	12.1	18	85.2
Toledo	6,430	274	42.6	154	23.6	29	102.1
Cayo	7 387	232	31.4	109	14.7	24	103.4
The Colony	66,893†	1,876	32.9	1 054	18.6	230	122.6

[† It will be noted that the District population figures do not aggregate 56,893 as given, and that the birth and death rates for *Orange Walk* are incorrect on the basis of population of 6,153. What has happened is that a printer's error has crept in transposing the population figures for Orange Walk which should read 6,613 to make the Colony total as stated.]

Figures showing the numbers resident invaliding and death rates of *European and Native Officials* are not available as these Officials are attended by Private Medical Practitioners

Maternity and Child Welfare Work—A considerable amount of information appears under this heading in the Report under review for in addition to a general survey of the work in the Colony as a whole almost without exception the Reports of District Medical Officers describe activities and progress in the areas for which they are severally responsible. Infant welfare appears to be well provided for but in some areas no facilities exist for ante natal supervision or hospital treatment of maternity cases in the absence of trained midwives the practice of irregular midwifery is by no means uncommon in the Districts. On the other hand it is noted that a Maternity Ward and Infant Welfare Centre were completed at the Stann Creek Hospital during the year.

There are *Infant Welfare Clinics* established in all Districts operated by Government Medical Officers and Head Nurses with the assistance of ladies in the various areas. The volume of work dealt with at these Centres may be summarized as follows—

District	Children on Registers	Average weekly Attendances	Health Visits
Belize	1 832	150	1 649
Corozal	158	30 55	?
Orange Walk	?	25 30	?
Stann Creek	280	20 25	?
Toledo	171	48 50	?
El Cayo	200	40	?

Reference is made to the amount of irregular midwifery practised in some areas and surprise is expressed that not more gross infection at childbirth is met with. Hospital Returns show under *Toxaemias of Pregnancy* that 23 cases were treated with 5 deaths.

School Hygiene—The medical examination of school-children in Belize has been systematically organized and during the year 2 119 children were examined. Detailed analyses of findings will be supplied in future Reports but for the year under review general impressions only are recorded. The *spleen rate* was 2.4 per cent. evidence of clinical *anaemia* of a mild type was observed and *pyodermites* seemed to be common. The Reports of four District Medical Officers refer to School Hygiene in their respective areas. In El Cayo District children were well nourished and the spleen index was low. The Stann Creek Report provides considerable detail. 841 children were examined and 22.6 per cent had enlarged spleens. height and weight tables and graphs with age and sex distinction are a feature. The medical examination of school children has been started in town and village schools in Corozal District and in Orange Walk District. Dr B E WASHBURN of the Rockefeller Foundation visited the Colony in October and remarked upon the healthy condition of school children seen in Belize.

Public Health Sanitation etc—Dr R. L. CHEVERTON Senior Medical Officer reports the health of the Colony continues to improve with improvements especially noticeable in the state of the nutrition of children. Organization of health services for administrative purposes remains as previously described (see this *Bulletin* 1935 Supp., p. 227*) but certain proposals for the reorganization of the Medical Department have been submitted for Government consideration. Meanwhile the advice of the International Health Division of the Rockefeller Foundation in regard to problems of public health in the Colony was sought, and in February Dr BOYD arrived to discuss with the responsible authorities a comprehensive scheme which had been prepared in anticipation of his visit.

Methods of sewage disposal remain for all practical purposes unchanged (see this *Bulletin* 1938 Supp. p. 241*). Considerable improvement could be made in refuse disposal systems in Belize and other towns. In the villages no system obtains and villages are described as being in "a filthy state". Sources of water supply remain as described in the previous issue of this Supplement.

With regard to housing the Report observes that on the whole the design of the houses is quite unsuitable for a hot humid climate. In Belize there are twenty slum areas where conditions become worse from year to year. A scheme for slum clearance has been submitted to the Local Authority.

The Reports of District Medical Officers which appear as Appendices to the Annual Report under review discuss general sanitation, water supplies etc. in the respective areas.

It is noted that the Medical Department has not a single Sanitary Inspector under its control, all Sanitary Inspectors being a charge on Local Authorities and therefore under the direct control of laymen on the Committees of Local Authorities.

The Report of the Senior Sanitary Inspector Belize supplies a detailed account of the work performed by Sanitary Inspectors during the year.

Dr Cheverton's recommendations for future work include (a) Reorganization of the Medical Department (b) Training of local Sanitary staff and general sanitation to be under the control of the Medical Department (c) A tuberculous survey (d) a malaria survey (e) An anti-hookworm campaign (f) Rebuilding of certain Hospitals and improvements to others, (g) Extension of Infant Welfare Work, (h) Dental services, (k) Dietary survey.

Port Health Work—Quarantine regulations were again in force against Central American Republics. People who cross the frontiers of the Colony at uncontrolled places are a source of danger while aerial traffic between the Colony and Mexico and Spanish Honduras increase the quarantine problems especially with regard to the possible introduction of yellow fever.

Hospitals Dispensaries etc—An Eye Department was added to the Belize Hospital, and a four-bed Maternity Ward to the Stamm Creek Hospital—no other changes are recorded. Plans for a new and larger hospital in Belize are in course of preparation. Several hospitals are in urgent need of extensive repairs. The volume of work dealt with during the year at the six Hospitals in the Colony may be summarized as follows—

Hospital	Beds	In patients	Deaths	Out patients
Belize	62	1 775	111	22 734 attendances
Corozal	20	270	14	No information given.
El Cuyo	12	234	7	
Orange Walk	11	151	12	1,340 patients attended Some 2,000
Stann Creek	20	484	22	
Toledo	8	326	8	

The figures for in patients and hospital deaths were extracted from the classified returns but these are not always in agreement with statements contained in the Reports of District Medical Officers. For example the Hospital Returns for Corozal show 270 in patients treated with 14 deaths but the District Medical Officer mentions 320 admissions and 22 deaths.

The training of nurses is undertaken at the Belize Hospital the course extending over a period of three years. Trained nurses are gradually replacing untrained ward maids in the District Hospitals.

The diseases which occupy the Medical Department to the greatest extent are malaria, helminthiasis, venereal diseases, deficiency diseases and pulmonary tuberculosis.

Malaria is a real economic problem neither Government nor employers of labour have so far devoted sufficient consideration to the principal cause of disability in the Colony. The classified Hospital Returns show that 758 cases of the disease were treated (in patients) with 26 deaths the distribution of types of infection being *benign tertian* 141, *quartan* 4, *subtertian* 146 and *unclassified* 467. Here again statements appearing in Hospital Returns are not always in agreement with Reports of District Medical Officers. The vector or vectors of malaria in the Colony are unknown though *A. albimanus* is thought to be primarily responsible. In this connexion the Medical Officer Stann Creek in the course of an excellent discussion of the malaria problem in this District observes: "The position of a Medical Officer is not enviable when he has to deal with malaria in a locality where the anophelines of the area are unknown, the various species that carry malaria are unknown and no technical assistance available to examine blood films of every patient." Nine cases of blackwater fever with one death are recorded.

The usual preventive measures were carried out but these are described as totally inadequate through lack of funds and lack of knowledge of the habitat of the infective vector. It is hoped that the visit and advice of Dr Boyd of the Rockefeller Foundation (see above *Public Health*) will serve to focus attention on the malaria problem and lead to the provision of services necessary to effect improvement in existing conditions.

No case of yellow fever has been recorded since 1921 but the increase in the *Aedes* index in Belize is said to be alarming. Despite all measures surveys show a high incidence of mosquito breeding (see this *Bulletin* 1938 Supp. pp 242*-243*). In a section of the Report which discusses malaria the following remarks appear:—A tendency to bleeding (renal and bowel) has been observed and in some cases ultimately developing blackwater fever manifesting signs of allergy, urticaria,

On the other hand, it is difficult to place some cases of grave jaundice (leptospirosis area of Yellow Fever?)

Alastrim is the only form of smallpox seen in the Colony and during the year 57 cases were recorded. It is believed that the original infection was introduced from Mexico. Regular vaccinations were carried out by Medical Officers and Public Vaccinators in towns and villages and 1 032 children under the age of five were successfully vaccinated.

No case of *enteric fever* was notified but of *dysentery* the Report observes "108 cases were treated in the various Hospitals during the year with 5 deaths." Actually Hospital Returns show 110 cases distributed as to 67 *amoebic* 19 *bacillary* and 24 unclassified. The responsible factors are again referred to (see this *Bulletin* 1938 Supp. p 243*).

Pulmonary tuberculosis continues to cause concern but apart from the returns of certified deaths, it is difficult to estimate the extent of the disease. During the year 29 deaths were certified as due to this cause but there were also 17 deaths (uncertified) ascribed to "consumption," "cough" or "cold." Among 48 cases (all forms) treated in Hospital with 7 deaths, 38 of the cases and 6 of the deaths were due to the *pulmonary* form of the disease. The *pneumonias* were responsible for 51 Hospital cases and 12 deaths.

Helminthiasis is described as "a potent source of chronic invalidism especially among the Mayan and Spanish elements; most children seem to be subject to worm infestation. *Achylostomiasis* is said to be prevalent in all districts. In-patients treated for the disease numbered 37 but it is noted that all except seven cases are dealt with as out patients and of these no data are supplied. The Medical Officer Stann Creek, observes, "The solution is again an economic one as both private latrines and the wearing of shoes require money. (See this *Bulletin* 1938 Supp. p 243*.)

Veneral Diseases which are extremely prevalent have so far received only spasmodic attention partly owing to lack of funds for specific treatment but more particularly owing to the apathy of the average person in seeking proper and adequate attention. In patients treated for syphilis numbered 100 for gonorrhoea 81 and for other forms of V.D. 44. The majority of District Medical Officers discuss the problem of social hygiene in their respective areas, the contribution of Dr L. M. RAM of Stann Creek calling for particular mention. The increased amount of labour employed in the mahogany camps in the Corozal and Orange Walk Districts was largely responsible for the increase in the numbers of cases in these areas.

Other diseases referred to in the Report under review and calling for brief mention in this Summary include the following. *Deficiency diseases* are more apparent than formerly and although Hospital Returns show only 4 cases of scurvy 2 of beriberi 4 of pellagra and 33 of other forms of *avitaminosis* nearly all District Medical Officers have something to say about malnutrition and its effects. In Toledo District *nutritional anaemia* and *macrocytic anaemia* of pregnancy are said to be very common. Dr RAM of Stann Creek discusses the diets of Caribs and Creoles, the existence of deficiency diseases and nutrition as judged by physical measurements. Dr D. W. DEGAZON of Corozal District also speaks of village diets and of the

investigation of a few cases treated in his Hospital. The whole question of nutrition has been discussed in a Report prepared in collaboration with the Agricultural Department and submitted to the Secretary of State.

One case of *relapsing fever* and one of *anterior poliomyelitis* are recorded in the Hospital Returns. Several cases of the latter disease are said to have been reported by local practitioners. Sporadic outbreaks of *nephritis* among children are mentioned. 45 cases of *nephritis* were treated in Hospitals. *Skin diseases* are very prevalent and are responsible for a considerable number of Hospital in-patients. The Report states that 54 cases of *cancer* were treated during the year but Hospital Returns show 30 cases of malignant disease with 6 deaths, 16 non-fatal cases of non-malignant tumours and 8 unclassified cases with 3 deaths.

Financial—Expenditure on Medical Department services during 1937 amounted to \$89,654.

JAMAICA (1937)

Jamaica, an island in the Caribbean Sea about 90 miles south of Cuba within 17°42' and 18°32' N. latitude and 76°11' and 79°23' W. longitude. It is the largest of the British West Indian Islands, being 144 miles long and 60 at its greatest breadth and having an area of 4,450 sq. miles, or about half that of Wales. Kingston, the capital, is on the south coast in the County of Surrey. The Cayman Islands and the Turks and Caicos Islands are dependencies of Jamaica.

Vital Statistics—The estimated population at the end of the year was 1,152,528. Estimated population figures are given for each of the 15 Parishes in the Island. Registered births numbered 35,362 and deaths 17,481, the resulting birth and death rates being 32.1 and 15.3 per 1,000 population respectively. It is noted that the death rate for 1937 was the lowest on record in the Island. The *infant mortality rate* is stated to have been 119 per 1,000 live births. The principal causes of death arranged in descending order of importance were *undefined fevers* 1,834, *congenital debility* 1,415, *infantile convulsions* (under 5 years of age) 1,255, *pulmonary tuberculosis* 1,019.

Maternity and Child Welfare Work—The ineffectiveness of the provisions for parochial maternity work was discussed in the Annual Report for 1936 (see this *Bulletin* 1936 Supp. pp. 244*-245*). Approximately 35,000 births are registered each year yet the 50 part-time nurses employed by the Parochial Boards delivered only about 1,300 cases while outside Kingston no provision is made for ante-natal clinics. It is estimated that scarcely more than 25 per cent. of the total deliveries in the Island are handled by qualified attendants.

By way of contrast it is noted that in the Corporate Area where about 5,200 births are recorded annually, about 1,500 are delivered in the Kingston Jubilee Maternity Hospital (in 1937 there were 2,520 admissions to this Hospital, 1,950 live births, 17 maternal deaths and 55 infant deaths), a considerable number by doctors and nurses at the homes of mothers and about 200 in Registered Nursing Homes. The Child Welfare Association recorded 11,640 attendances of sick

babies and 5,339 attendances of other babies at their clinics while the Jubilee Hospital and the Association together recorded 7,487 attendances at ante-natal clinics.

Maternity Wards have been completed at the Port Antonio, Buff Bay, Annotto Bay and Sav-la-Mar hospitals. Parochial Boards are said to be showing increasing interest and a desire to co-operate with the Government in providing Public Health Nurses and Maternity and Child Welfare Services.

School Hygiene—The Corporate Area of Kingston and St. Andrew is the only Local Authority provided with a School Medical Service. In this area the nutritional status of from 20-55 per cent. of the 8,000 children examined is stated to be unsatisfactory. In other Parishes Health Officers carried out preliminary surveys on groups of school children. Among 6,830 children examined the nutritional condition of 41 per cent. was stated to be sub-normal, and defective vision was observed in 15 per cent. *School Dental Clinics* are maintained in eleven parishes.

The Schools Medical Officers found that among 1,103 school-children examined 43 gave Wassermann or Eagle reaction; the Kahn reaction was not carried out on each case, but where this test was applied results were almost identical. There was a definite history of yaws in 13 of the 43 positives, thus reducing the number of possible cases of congenital syphilis to 30.

Public Health Sanitation etc.—A year of steady progress and development is recorded: a staff of 3 Senior Sanitary Inspectors, 2 Dispensers, and 28 Sanitary Inspectors is provided to assist Local Boards of Health in various health measures. *The Malaria Control Officer* contributes a separate Report in which is described the control work carried out in the Island.

With regard to *sewage disposal* it is stated that considerable extensions to the sewerage system of Kingston were carried out: plans were completed for sewerage installation in certain areas and work was started on the erection of a modern Sewage Disposal Plant at Kingston Pen. In other areas, 13,643 new latrines were completed during the year (see this *Bulletin* 1938 Supp. p. 245*). Investigation of *water supplies* showed that only about 30 per cent. of the total population have regular access to public water supplies, the rest of the population being dependent upon unsafe sources (see this *Bulletin* 1938, Supp., p. 246*). During the past two years it is said that marked progress has been made in the direction of improving the several main supplies in quantity and quality. Towards the end of the year work was begun on a new Purification Plant for the Kingston supply and on a plant similar in type for the Stony Hill supply. Construction work was also well advanced for augmenting and purifying supplies to four other towns and plans are being prepared for dealing with supplies to smaller towns and settlements.

Regular inspections of *dairies* and *milk shops* were carried out and steady improvement in the production and handling of milk is reported with an increasing use of pasteurized milk. The Medical Department was much occupied during the year with the problem of *housing* (see this *Bulletin* 1938 Supp. p. 246*) which developed with the establishment of a *Central Housing Authority* with powers under the Slum Clearance Law of 1937. Improvement schemes were sanctioned

by Government for dealing with specific areas and surveys of conditions in certain parishes are also being carried out

Recommendations made (see also this *Bulletin* 1938 Supp pp 246*-247*) include (a) Development of Maternity and Child Welfare Work (b) Provision of District Maternity Services and (c) Provision of Chief Sanitary Inspectors of senior type for sanitary areas

Port Health Work—This continued to be carried out along lines previously described (see this *Bulletin* 1938 Supp p 247*) During the year 1 423 vessels entered Kingston and Port Royal and 109 at the outports One case of *bubonic plague* was landed from a vessel arriving from Brazil no other cases occurred As regards *aerial traffic* no aerodrome for land planes has yet been provided 287 seaplanes arrived during the year

Hospitals Dispensaries etc—The need for increased accommodation at several hospitals (many are 20 to 60 per cent overcrowded) is very acute and can only be met in many cases by additional buildings. Maternity Wards were completed at four hospitals (see *Maternity Work* above) tuberculosis wards were added to two district hospitals and three others are in course of erection a new hospital of 50 beds is to be built at Alexandria a new Tuberculosis Dispensary was completed and a new V D Clinic was opened at Kingston The following summary universally measures the volume of work dealt with at the various hospitals etc. in the Island —

Institution	Beds	In patients			Out patients
		Admitted	Treated	Died	
Public Hospital Kingston	380	8 345	8 685	782	180 479
Victoria Lying in Hospital	100	2 520	2 520	17	3 773
19 District Hospitals	903	—	28 471	1 216	79 658
Mental Hospital	2,089	572	2 640	258	—
Lepers Home	120	23	191	14	—
Tuberculosis Hospital	—	116	—	34	—

Among the *Special Reports* appearing in the Report under review are those relating to (a) The Kingston Public Hospital, (b) The Victoria Jubilee Lying in Hospital (c) The Mental Hospital (d) The Lepers Home (e) The Prisons, (f) Tuberculosis Hospital.

The *Out-door Dispensary Services* continue to meet the steady increasing demand of the public. Five new dispensaries were opened during the year at all centres 221 987 attendances for treatment were recorded.

The *training of nurses* continued to be carried out at the Kingston Public Hospital 69 nurses sat for and passed their final examinations. Ten students trained at the hospital qualified as Dispensers.

Notifications of infectious diseases numbered 2,661 and of these 1,311 were cases of *pulmonary tuberculosis* and 781 *typhoid fever* The principal items of morbidity experience during 1937 are briefly referred to in the notes which follow

Judged by general mortality and hospital figures the incidence of malaria declined markedly during 1937. Total deaths ascribed to this cause in the Island numbered 504. In-patients treated for malaria at the Kingston Public Hospital numbered 693 and 29 died. At the District Hospitals 2,974 in-patients were treated, with 114 deaths and 7,347 out-patients were dealt with, suffering from the same cause. The type of infection is not differentiated in any of the hospital cases, neither is this done in the Laboratory where nearly 5,000 blood films were examined for the presence of malaria parasites and positive findings recorded in 803 cases.

The Malaria Officer contributes a detailed report of the year's work of the Department of Malaria. The general programme of malaria control was again extended, and a more generous provision of funds for permanent control measures was provided.

A marked reduction in the number of cases of enteric fever is reported—781 as compared with 1,278 in the preceding year. Deaths in the Island due to this cause numbered 185. The decrease is more marked in the Corporate Area where there were 166 cases with 48 deaths as against 337 cases and 62 deaths in 1936. A water-borne epidemic occurred in a wide rural area of the Parish of St. Catherine between June and September and gave rise to 73 cases. The river which is the source of supply for the people in this area is heavily polluted. Altogether 130 cases and 7 deaths were notified from the Parish of St. Catherine during the course of the year. At the Kingston Public Hospital 137 cases of enteric fever were treated with 43 deaths, and at the 19 District Hospitals there were 413 in-patient cases with 105 deaths and 22 out-patients. During the year 32,454 anti-typhoid inoculations were given, special attention being devoted to the protection of school-children who provide about 30 per cent. of the cases notified. At the Laboratory agglutination tests were applied to 2,596 samples of blood serum. 662 agglutinated positively with *Bact. typhosum*, 468 gave doubtful and 1,450 negative reactions, 1 was positive with *Bact. paratyphosum A* and 3 *Bact. paratyphosum B*.

Of dysentery 132 cases were notified and of these 83 were amoebic, 4 bacillary and 35 unclassified. The Kingston Public Hospital dealt with 37 amoebic cases, 1 bacillary and 6 were unspecified as to type of infection. For the District Hospitals the corresponding figures were 14, 4 and 9 respectively. Dysentery is not referred to in the text of the Report. Deaths due to diarrhoea and enteritis in the Island as a whole numbered 470.

During the year 1,311 cases and 1,019 deaths due to Pulmonary tuberculosis were recorded. 46 per cent. of the cases notified came from the adjacent parishes of Kingston, St. Andrew and St. Catherine. Although there appears to be a progressive decline in the incidence of the disease, investigations carried out during 1937 showed that a very high proportion of children of school age both in urban and rural areas gave a positive tuberculin reaction. In Kingston and Clarendon schools over 90 per cent. and in a Milk River school 97 per cent. were positive. At the Kingston Tuberculous Dispensary 3,664 new patients were examined and 8,550 attendances of old patients were recorded. Outside the Corporate Area, Health Officers recorded 8,154 attendances at their Clinics.

Special Reports describe in detail work at (a) The Tuberculosis Clinic (b) The Tuberculosis Hospital and (c) The Tuberculosis Wards at the Poor House

Mention has already been made of the newly built T B wards at certain hospitals (see *Hospitals* above). It is said that the building of the Tuberculosis Sanatorium will be put in hand early in 1938 (see this *Bulletin* 1937 Supp p 244*). At the laboratory among 1,919 specimens of sputum examined 449 were positive with *Mycobacterium tuberculosis*.

Pneumonia caused the deaths of 653 persons in Jamaica during 1937

Twenty five cases of *leprosy* were notified at the end of the year there were 245 known lepers in the Island 165 of them being in the Lepers Home. The Medical Officer in charge of the Lepers Home contributes a Report describing the year's work at that institution. The wards are still overcrowded especially on the female side. There were 22 admissions 12 patients were discharged 14 died and at the end of the year there were 165 inmates on the registers. Out of 335 smears etc. examined at the Laboratory 199 were positive with *Mycobacterium leprae*.

Helminthic diseases are not mentioned in the text of the Report except one short reference to the fact that in the Lambs River area of Westmoreland 67 per cent of the population were infected with hookworm and that 6,686 treatments were given to 2,268 persons. At the Kingston Public Hospital 27 in patients were treated for ankylostomiasis, and 19 for other intestinal parasites at the 19 District Hospitals under the title *parasites* 363 in patients and 958 out-patients were treated. Faecal specimens examined at the Laboratory numbered 3,528 and of these 1,312 contained *Ancylostome* 734 *Trichuris*, and 207 *Ascaris* ova.

Venereal Diseases—The following records are supplied of cases dealt with during the year —

Treatment Centre	In patients		Out patients	
	Syphilis	Gonorrhoea	Syphilis	Gonorrhoea
Kingston Public Hospital	416	385	1,154	
19 District Hospitals	2,055	1,160	9,017	3,974
Kingston V D Clinic	—	—	4,391	6,227
Montego Bay V D Clinic	—	—	1,223	1,397
Port Antonio V D Clinic	—	—	707	543

Work at the Montego Bay Clinic began in July and at the Port Antonio Clinic in October 1937. The Kingston Clinic was transferred to the newly constructed building in September. A special report of the year's work at the V D Clinics is included in the Annual Report under review (see also *School Hygiene* above).

The work of the *Yaws Commission* in which the Government and the Rockefeller Foundation co-operated ceased in April and the work was taken over by the Government. Under the new scheme Health Officers survey their areas and collect cases for treatment by Medical Officers of Districts at special centres while two *Mobile Health Units* are maintained for work in heavily infected yaws areas.

The Report contains full accounts of the year's activities in the campaign against yaws the following findings are recorded —

Outside areas of highest endemicity

Population 439,819 active cases found 9,508 or 2.2 per cent.

In areas of high endemicity (in four parishes)

Population 76,635 active cases found 6,802, or 8.0 per cent

A total of 129,745 treatments were given to 30,611 cases throughout the Island

At the Laboratory routine serological examinations for syphilis totalled 30,518 and of these 11,910 gave positive and 1,131 doubtful reactions. Smears microscopically examined for gonococci numbered 8,560 and 5,244 of these gave positive findings

Other diseases — Though nephritis is not mentioned in the text of the Report the disease is a serious cause of mortality for 628 deaths were ascribed to this cause. At the Kingston Public Hospital 71 in patients were treated for nephritis and 8 died. How many cases were dealt with in the District Hospitals it is impossible to state for this title is lost in the group *Diseases of the Genito-Urinary System* this group was responsible for 2,785 in patient cases, 4,780 out-patients, and 151 deaths. Cancer caused the deaths of 387 persons in the Island in patients treated for this cause at all hospitals numbered 399 with 57 deaths. Notified cases of diphtheria numbered 29 of scarlet fever 22, of erysipelas 21 of cerebrospinal meningitis 8 and of chickenpox 332.

Scientific — The work of the Government Laboratory continues to increase and during the year under review 71,701 specimens were examined, exclusive of 18,651 larval examinations. It will be impossible to deal with any further increase in the volume of work without increase of staff. The Report of the Laboratory contributed by Dr K. Leigh EVANS contains a detailed account of the nature of the specimens examined and results recorded. The principal of these have been mentioned in various sections of the preceding summary notes.

The following *Special Reports* are a feature of the Report under review —

(1) *Special Tuberculosis Studies* by Dr E. W. FLAHERTY of the Rockefeller Foundation. These studies comprise (a) a Report of the work done at the Mental Hospital during the year and (b) a Report of the work done at the Stony Hill Industrial School. The results of tuberculin tests, X-ray examinations, vaccinated cases and controls etc. are discussed at considerable length.

(2) *The Treatment of Gonorrhoea with Sulphanilamide* by Dr K. Leigh Evans.

This study discusses the results of sulphanilamide therapy in 295 cases.

Financial — Total expenditure on Medical Department Services during 1937 amounted to £211,236, a sum which represents 8.4 per cent. of the total expenditure of the Colony during the same year

CAYMAN ISLANDS (1937)

The Cayman Islands, three in number namely Grand Cayman Little Cayman and Cayman Brac form a dependency of Jamaica and lie between 79° 83' and 81° 30' W longitude and 19° 16' and 19° 45' N latitude. They have a total area of about 104 square miles.

The Annual Medical Report for 1937 had not been received at the time of going to Press on October 16th 1939 (See also this *Bulletin* 1938 Supp p 251*)

TURKS AND CAICOS ISLANDS (1937)

The Turks and Caicos Islands geographically are a sort of annexe of the Bahamas group but in 1973 were annexed to Jamaica which lies about 450 miles to the south west. They are situated between 21° and 22° N latitude and 71° and 72° 37' W longitude and have an area of about 166 sq miles. The chief island Grand Turk is 6½ miles long 1½ broad.

Vital Statistics—In previous issues of this Supplement attention has been called to the fact that the census figures for 1921 recording a population of 5 612 continue to be used each year and applied for the calculation of annual birth and death rates—the practice still persists.

Registered births numbered 165 and *deaths* 90—the birth and death rates (on the basis of the 1921 population) are said to be 29.4 and 16.0 per 1 000 respectively.

Infant deaths are not given but the infant mortality rate during 1937 was said to be 127.

School Hygiene—Under this heading mention is made of the regular dental inspection of school-children—free treatment was given to 92 children and 61 others were treated at reduced rates. Instruction in hygiene was given by teachers in charge of schools.

Public Health Sanitation etc—The health of the Dependency is reported to have been fair. The Inspector of Nuisances reported the sanitary conditions as satisfactory—no quarantinable diseases were notified and the isolation houses in the Hospital grounds were not in use during the year. With regard to *labour conditions* it is said that though 1937 was a normal salt-producing year the salt season is short and the long periods of unemployment give rise to great hardship to labourers and their families. Supplies of fresh meat vegetables etc. are imported in sufficient quantities but the labouring classes lack the means to purchase such foods (see below *pellagra*). If relief work could be provided for labourers between the salt seasons it would serve to ameliorate existing hardships.

Hospitals etc—A brief statement records the yearly admissions to the Hospital Grand Turk viz 5 cases and one death.

Pellagra was in evidence as usual, mostly among those compelled to exist on a restricted and limited diet—there were two hospital cases with one death. At the Dispensary 35–40 infants were treated for diseases of the digestive tract while cases of *anaemia* and patients with *beriberi* like symptoms etc. directly or indirectly due to dietary

LEEWARD ISLANDS (1937)

deficiency and mostly among children, were among other conditions dealt with.

Skin diseases such as *eczema impetigo* etc., were noticeable among children and young women while among adults muscular and articular *rheumatism* acute and chronic *nephritis* *arteriosclerosis* and *diseases of the digestive tract* were commonly treated. Ten cases of *tuberculosis* are mentioned.

Helmithic diseases—Eight cases of *anchuriasis* and one of *taeniasis* were treated at the Dispensary. Dr R. O'REILLY, Government Medical Officer, observes that "ascaris and oxyuris were in evidence among the school children as usual," and adds that great difficulty is experienced in persuading parents to accept offers of free treatment for their children.

Veneral Diseases—For years the Dispensary has provided free treatment for patients unable to pay. The difficulty has always been to persuade patients to continue treatment to cure. During the year two cases of primary *syphilis* and five of *gonorrhoea* were under treatment.

Leprosy remains much about the same." There are five known cases and no new cases were discovered during the year.

Financial—The various details of expenditure totalling £494 19s. 7d. include £46 13s. 1d. spent on Hospital services, £270 5s. 3d. on Pauper Relief, £35 2s. 6d. on the maintenance of Lepers, £94 18s. 8d. for Lunatics and £48 for the Dental Inspection of school-children.

LEEWARD ISLANDS.

Antigua (1937)

Antigua, with Barbuda and Redonda, forms one of the *Presidencies* of the Leeward Islands. It lies in W longitude 61° 45' and N latitude 17° 6'. Its circumference is about 54 miles and area 108 sq. miles, or about half the size of Middlesex.

Vital Statistics—The Registrar-General supplies the following figures: Estimated Population 34,523; registered births 1,157; birth rate 34.53 per 1,000; registered deaths 689; death rate 20.57 per 1,000; infant deaths (excluding stillbirths) 193; infant mortality rate 171.1 per 1,000 births. [It is not clear how these rates have been calculated. On the basis of the given population the birth and death rates would be 33.5 and 20.2 per 1,000 respectively, and if all registered births were live births the infant mortality rate would be 169.8.]

At the end of the Report deaths are classified by sex in age-groups for each of the six parishes in Antigua and for Barbuda. A total of 710 deaths is given and of these 688 occurred in Antigua (see above).

Maternity and Child Welfare Work is carried out by 25 District Nurses in Antigua, one Midwife at Barbuda and the Superintendent of Midwives who reports that good work continues to be done at the

three Government creches where 7 400 children were dealt with during the year ante-natal and post natal work in all districts increases in volume and importance. Pupil midwives receive instruction at the Holberton Hospital. Dr L. R. WYNTER Medical Officer of Districts A and B reports that syphilis is responsible for a high percentage of infant deaths in these areas.

School Hygiene—The medical inspection of school-children is listed under Special Services but actual references in the body of the Report are fragmentary. Dr Wynter observes that in his territory schools were visited and talks given on the prevention of common diseases while Dr C. E. BAILEY reports that periodic visits were paid to all schools in District D. A widespread epidemic of measles caused the closing of many schools in the early months of the year. The Dental Surgeon states that 23 schools were visited during the year 1 066 children treated and lessons on oral hygiene given at each school.

The health of the boys at the *Training School* is stated to have been remarkably good with improvements in physique and general health. During the year 20 boys received treatment for minor cases of sickness.

Public Health Sanitation etc—Sanitary and health conditions in the City of St. John are described as by no means satisfactory owing in large measure to the lack of a trained Sanitary Inspector. Methods of garbage removal are open to objection the large numbers of domestic animals kept are a menace to the health of the community at large and uncontrolled slum areas are a source of expense and anxiety. Few places from which food is distributed are satisfactory and milk is said to be sold under particularly insanitary conditions. The water supply on the whole is satisfactory and adequate as to quantity but steps need to be taken for the protection of the reservoirs from possible contamination. All these matters are receiving the attention of the City Commissioners. The six Sanitary Inspectors in the country districts continued to carry out their duties efficiently and render weekly reports of their work (see this *Bulletin* 1938 Supp. p. 253*). Dr L. R. HURSON Veterinary Surgeon contributes a short report in which he records that 2,979 animals were slaughtered for food purposes and the carcasses examined and that 303 cows were certified as healthy for the supply of milk.

Hospitals Dispensaries etc—During the year various constructional improvements were carried out at the Holberton Hospital where 969 patients were admitted and 1 058 in-patients treated. 87 died. Once again Dr J. E. WRIGHT calls attention to the fact that a very high percentage of admissions were due to preventable diseases. The *training of nurses* was continued as usual at this institution.

Dispensaries are referred to under the heading of Special Services but how many are established is not stated nor are out patient cases at the Holberton Hospital mentioned. The Medical Officer Districts A and B refers to 6 000 non-paying patients (presumably dispensary cases) in District D where there are 5 dispensaries total attendances numbered 10,803 and in District E having a population of 6,500 cases seen at the surgery of the Medical Officer totalled 3 800.

At the *Prison* 681 cases were dealt with but only 15 prisoners received in-patient treatment and no deaths were recorded. At the

Fewkes Institute (for the aged and infirm ?) 138 persons were admitted, 51 discharged and 67 died

Malaria continues to prove a serious public health problem. Many of the villages are situated on the edge of or in close proximity to swamps, and everywhere roadside trenches and crab-holes provide abundant breeding places for anophelines. Control measures continued to be actively implemented to the limits of available resources but these are insufficient to deal adequately with the problem. Improvement has resulted from the routine inspections each week in all villages by Sanitary Officials who strive to overcome local indifference and ignorance. During the year 3062 cases and 49 deaths were ascribed to malaria. At the Holberton Hospital 41 in-patients were treated and 4 died. 37 of the cases and 3 of the deaths were ascribed to subtertian malaria. In Districts A and B 336 cases were treated and in District D 1,353 cases with 6 deaths, and 1 (non fatal) case of *blackwater fever*. The numbers treated in District E are not given but the disease is described as having been very prevalent and it is stated that the dangerous cerebral type was prevalent. In all areas subtertian infections predominate. At the Laboratory where 1580 blood films were examined 199 were found to contain malaria parasites. These include 163 subtertian infections, 13 quartan and 3 *beneson tertian*. Seventeen contained crescents.

Isolated cases of *enteric fever* were reported from various parts of the Island between August-October but details of cases are not supplied. Possibilities for contamination of certain water supplies were discovered, and steps were immediately taken to remedy defects in this connexion. At the Holberton Hospital 21 cases and 4 deaths were ascribed to this cause. Four cases were reported in District A and five in District E, all were hospitalized and all contacts received T.A.B. inoculation. At the Laboratory the Widal test was applied to 30 samples of serum, and 12 positive reactions recorded. *Dysentery* was limited to sporadic cases. In-patient hospital cases numbered 9 and of these 6 were suffering from the bacillary type of the disease and 3 died. It is believed that many undiscovered cases of the disease occurred during the year.

Tuberculosis (all forms) was responsible for 26 hospital in-patient cases. 15 of these were suffering from the *pulmonary* form of the disease and 10 died. It is also stated that 19 cases of pulmonary tuberculosis with 3 deaths occurred in District D and that in District E where 5 new cases were seen, the disease appears to be increasing. The Laboratory Report observes that out of 87 specimens of sputum examined 22 were positive with *Mycobacterium tuberculosis*.

An epidemic of *measles* occurred in the early part of the year and caused the closing of many schools. The infection appears to have been introduced from St. Kitts during February and to have spread to all Districts. No cases appear in the Returns of the Holberton Hospital and though mention of the epidemic occurs in all District Reports, in only two of them are details supplied. In District A 135 cases were recorded, but it is added that "the figure does not show by any means the numbers of cases". In District D there were 260 cases with 3 deaths. Though only two (non-fatal) cases of *influenza* appear in the Hospital Returns, the disease appears to have had marked incidence. In District A, 654 persons were treated and 2 died, in

District C it was one of the chief causes of illness (no details given) affecting chiefly young and old people and in District D 95 cases were dealt with and 1 death ascribed to this cause.

Leprosy appears to be increasing there are 35 cases in the Lepers Home and 34 known cases outside. Legislative provision has been made for the compulsory segregation of infected persons (see this *Bulletin* 1938 Supp. p. 253*).

Veneral Diseases—The percentage of the population infected with syphilis is said to be very high though precise knowledge concerning this is lacking. gonorrhoea is also the cause of a high morbidity rate. At the Holberton Hospital 68 in patients were treated for syphilis and 10 deaths were attributed to this cause and there were also 34 cases of gonorrhoea and 6 of gonorrhoeal or purulent ophthalmia. In District C 124 cases of syphilis and 50 of gonorrhoea and in District E 150 cases of syphilis were seen. At the Laboratory the Kahn test was applied to 787 samples of sera and 363 positive reactions were recorded. Yaws is mentioned in the District E report where it is said 7 to 10 new cases are seen each year.

With regard to other conditions it is stated that *malnutrition* and improper feeding are the cause of much illness and not a few infant deaths. deficiency disease are not uncommon. *Impetigo* and other skin conditions are frequently met with among children. A large number of children suffer from *ascariasis* in District D alone 804 children were treated for this condition.

Scientific—Under this heading all that can be included is the summary of Laboratory work. During the year 3,367 specimens of various kinds were examined and reported upon. some of the findings recorded are referred to in the preceding notes.

Financial—Total expenditure on Medical Department services 1937 during amounted to £13,971 personal emoluments accounting for £5 035 of this sum.

Dominica (1937)

Dominica the largest and most southerly island of the Leeward Islands Colony is of volcanic origin. It measures about 29 miles long and 15 broad and has a total area of 304 sq miles or about double that of the Isle of Wight. It is situated between 15° 20'–15° 45' N latitude and 61° 13'–61° 30' W longitude and lies 93 miles south of Antigua.

Vital Statistics—No Census has been taken since 1921 but the estimate of the Registrar-General shows the population to number 49,483 (23,466 males, 26,017 females) at the end of 1937. Registered live births numbered 1,487 deaths 711 and stillbirths 62. The birth and death rates were 30.3 and 14.5 per 1,000 of the mid year population respectively.

Of the live births 58 per cent. and of the stillbirths 61 per cent were illegitimate.

Infant deaths numbered 170 giving an infant mortality rate of 114.3 per 1,000 live births.

During recent years the tendency of the birth rate to decline has been accelerated by reason of the emigration of young people to other

Veneral Diseases—District Medical Officers reported 648 cases of syphilis and 346 cases of gonorrhoea and its complications. Fifty two cases of syphilis 47 of gonorrhoea 6 of soft chancre and 4 of lymphogranuloma were treated in Hospitals. Of years 1 108 cases were notified, and 3,853 cases of the disease and its sequelae were treated during 1937. One section of the Windward Coast is said to be especially difficult of control for it is only possible for a Medical Officer to visit the area once a month.

Of the 32 known cases of leprosy in the Island 4 died during the year two new cases were notified both former residents of the Guianas. The construction of a new Leper Home approaches completion.

Other diseases—It is stated that diseases of the digestive system account for a high proportion of the cases seeking treatment, and that many of these are debilitated persons suffering from deficiency of protective foods in their diets. Digestive disturbances among infants due to improper feeding are exceedingly common.

Financial—Actual expenditure on Medical Services during 1937 amounted to £11,204 a sum which represents 17 per cent. of the revenue or 16½ per cent. of the expenditure of the Presidency during the same year.

Montserrat (1937)

Montserrat, named by Columbus after a mountain in Spain, lies in 18°45' N latitude and 61° W longitude 27 miles S W of Antigua. Its length is 11 miles and its greatest breadth 7 miles and its area 32½ sq miles.

Vital Statistics.—The estimated population at the end of the year was 18 712. Registered births numbered 449 and deaths 210 giving crude birth and death rates of 32·7 and 15·3 per 1 000 respectively. Infant deaths numbered 71 with an infant mortality rate of 158·1 per 1 000 live births. (It is presumed the 449 registered births were live births stillbirths numbered 24 and are separately mentioned.)

Maternity and Child Welfare Work—Special attention is paid to ante-natal work. Expectant mothers registered at the Glendon Hospital are advised to attend for examination each month during the latter part of pregnancy a good response resulted. In the Maternity Ward of the Hospital 80 mothers were delivered of their babies there were no maternal deaths. No organized Child Welfare work has so far been attempted though plans are under consideration. Meanwhile a follow-up of babies born in Hospital has been commenced, and mothers have been invited to bring their babies to the Hospital for examination each month.

School Hygiene—Owing to the pressure of other work it is said that some degree of irregularity characterized the usual practice of periodical visits to schools by Medical Officers. The question of overcrowding has in some cases been dealt with by the provision of increased accommodation a new school for infants has also been erected. Special attention was devoted to improving latrine accommodation. The usual instruction in the elements of hygiene was continued.

Public Health Sanitation etc—The first two months of the year were unusually wet and were followed by four months of drought. These unfavourable weather conditions adversely affected the agriculture of

the Island another bad year was experienced and the general economic situation gave rise to great anxiety. nutritional disturbances and general poverty were more in evidence than usual.

The sanitation of the town of Plymouth leaves much to be desired and in country districts conditions are even less satisfactory (see also this *Bulletin* 1938 Supp p 257*). The augmented water supply of Plymouth was satisfactory as to quality and an adequate supply was always available even during the dry periods of the year. consumption steadily increases owing to the increasing number of water borne septic tank installations in private dwellings. In country districts piped supplies have been constructed to some of the remote villages. Steady progress is reported in housing and reconstruction schemes and new buildings are helping to relieve congestion (see this *Bulletin* 1938 Supp p 258*).

The staff of the sanitary department remained unchanged. Sanitary Officers continued to render their quarterly reports of work accomplished and their suggestions for improving conditions. These reports are considered at the meetings of the Board of Health and necessary action taken.

Hospitals Dispensaries etc—The new Glendon Hospital (see this *Bulletin* 1938 Supp p 258*) though formally opened by His Excellency the Governor in February was not ready for the accommodation of patients until the middle of May. The new building provides male and female general wards maternity ward children's ward out patient departments etc. There is bed and cot accommodation for 40 patients. During the year 495 patients were admitted, 511 were treated and 19 died. In addition 315 out patients were dealt with. *Dispensary Clinics* were held at weekly intervals at three centres and monthly visits were resumed to a fourth centre towards the end of the year.

The principal ailments treated at the hospital and dispensaries during the year included the following—

Three cases of *malaria* were reported one fatal subtertian and two benign tertian. Anophelines though present around the swamps near the West Coast have not become widespread throughout the Island or they have remained uninfected. Twelve cases of acute *filariasis* are recorded three being treated as in patients. The offending *Culex fatigans* is common and a campaign has been organized for the extermination of these pests.

Epidemics of *influenza* occurred and the gastro-intestinal form exacted a heavy toll of infant lives while broncho-pneumonia was a frequent complication. Eight deaths were ascribed to influenza and ten to broncho-pneumonia.

No cases of *fevers of the enterica group* were reported. Hospital returns record 2 cases of *amoebic* and 3 of *bacillary dysentery*. In the Island mortality returns one death was ascribed to *dysentery* (unclassified) 39 to *diarrhoea and enteritis* among children under 2 years of age and 5 to persons over two years of age.

Among 18 cases of *tuberculosis* (all forms) reported during the year were 15 of the *pulmonary* form of the disease and of the latter 7 died. *Helminthic diseases*—It is said that about 50 per cent of the population and 75 per cent of the children are infected with round worms.

Veneral Diseases—In the Island as a whole 18 deaths were certified as due to syphilis and more than half of these were cases of congenital syphilis in the first two years of life. Four cases of primary and a considerable number of tertiary manifestations of the disease were seen during the year. Among other venereal diseases treated were 17 cases of acute gonococcal arthritis 9 cases of acute salpingitis and 10 cases of procto-vaginitis in young girls.

It is said that yaws is slowly and steadily disappearing, and that acute primary cases are gradually becoming fewer. Crab yaws and yaws ulcers are still met with and in some cases are very resistant to treatment. Injections given for yaws and syphilis totalled 1,278.

Other diseases—The general mortality returns record 19 deaths due to cardio-vascular diseases and 21 under the title *Sensility* among the latter were 7 centenarians, one a woman aged 109 years. Cancer claimed the lives of 15 persons and nephritis 10.

Financial—Expenditure on Medical and Sanitary Services during 1937 amounted to £3,371 a sum which represents about 10 per cent. of the total revenue of the Presidency during the same year.

St. Christopher and Nevis with Anguilla (1937)

The islands of St. Christopher and Nevis with Anguilla are part of the Lesser Antilles group and constitute one of the five Presidencies forming the Leeward Islands Colony in the West Indies. Their total area is about 150 sq. miles.

Vital Statistics—Among the legislative measures passed during the year mention is made of "An Ordinance to amend the Registration Ordinance 1885" what amendments are to be introduced is not stated. As regards the relevant vital data for 1937 they may be classified as follows—

Item	St. Kitts	Nevis	Anguilla	The Presidency
Estimated population	18 694	13 724	5 639	38 057
Registered Live Births	807	411	193	1 411
Birth Rate	43.2	29.9	34.2	37.1
Registered Deaths	632	183	71	886
Death Rate	33.8	13.3	12.6	23.3
Infant Deaths	169	44	15	228
Infant Mortality Rate	200.0	107.1	77.7	181.6
Stillbirths	60	21	6	77

Maternity and Child Welfare Work—The Baby Saving League managed by a Board of voluntary workers with the Senior Medical Officer as Chairman and the District Matron as Secretary continues to function successfully six crèches are maintained in St. Kitts and one in Nevis, but additional crèches are an urgent requirement. The Medical Officer No. 1 District observes, "The feeding of infants is still a depressing problem and advice usually falls on barren ground."

The Medical Officers of Districts 2, 6 and 7 all comment upon the incidence of congenital syphilis in children—endeavours are made to persuade expectant mothers to submit to a Kahn reaction test but not all are willing to do so, nor are they inclined to act upon medical advice given them.

The record of work carried out in the Maternity Wards of the various Hospitals reads as follows—*Cunningham Hospital* 102 labour cases 3 maternal deaths *Alexandra Hospital* Nevis 68 labour cases *Pogson Hospital* 12 and the *Cottage Hospital* Anguilla 1 labour case.

During the year 27 registered midwives were supervised and supplied with drugs and dressings for their District work—only 14 of these women receive Government pay. Records of the year's work include mention of 428 visits of mothers to midwives 177 visits of midwives to crèches 163 ante natal visits and 119 first visits to infants. Reference is made to the status and training of midwives on the Register and it is pointed out that 18 years ago a large number of midwives were registered by virtue of the fact that they were in actual practice at the time the Midwifery Ordinance was passed. It is added that these women are now old decrepit and dirty and their names should be removed from the Register though if this were done they should be compensated from parochial funds.

School Hygiene—Once again work under this heading is mainly confined to details supplied by the Dental Surgeon Dr E. A. WILKIN (see this *Bulletin* 1938 Supp. p. 259*) who visited the primary schools in the Presidency. Apart from the record of extractions for school-children the Dental Surgeon observes: "The children of the Anguilla schools still seem undernourished and I am satisfied with the marked improvement in the condition of the St. Kitts children. I feel much more could be done to educate the children and parents by way of lectures in the school—not only on the care of the teeth but on general health matters."

Public Health, Sanitation etc—Mosquito control measures continued to be applied throughout the year. Descriptions of methods of *sewage and refuse disposal* remain unchanged (see this *Bulletin* 1938 Supp. p. 260*) and the only new item of information relating to *water supplies* describes an additional source of supply which provides 28 000 gallons per day. The *housing* of the working classes remains a matter demanding urgent attention—considerable congestion is a feature of some districts.

Port Health Work—Though the Port of Basseterre is provided with a Port Health Officer (see this *Bulletin* 1938 Supp. p. 260*) no record of the year's work appears in the Report under review.

Hospitals, Dispensaries etc—Separate reports describing the year's work in each of the medical institutions of the Presidency are included in the Report under review. For the four Hospitals, the relevant details may be classified as follows—

Hospital	Admissions	Treated	Deaths	Out patients
Cunningham, St. Kitts	700	812	71	110
Alexandra, Nevis	620	650	40	89
Pogson	78	84	4	80
Cottage Anguilla	43	—	1	59

At the Cunningham Hospital, St. Kitts, and the Alexandra Hospital, Nevis, provision is made for the *training of nurses*.

To the *Home for the Infirm Poor* St. Kitts, 55 persons were admitted and during the year 113 persons were accommodated. 9 of the inmates were admitted to Hospital and 39 deaths were recorded.

The principal diseases treated during the year and commented upon in the Report under review include the following —

Malaria —It is again stated that anopheline mosquitoes are present in Nevis but do not appear to spread to St. Kitts or Anguilla. During the year 78 cases of malaria with 1 death were reported. Only 2 non-fatal cases were treated at the Cunningham Hospital St. Kitts but it is noted in addition that there were 32 cases of *unspecified fever* with 1 death. At the Alexandra Hospital Nevis, 22 (non-fatal) cases of the disease were dealt with. District Medical Officers make no mention of the incidence of malaria in their respective areas. The Report of the Bacteriological Laboratory refers to the examination of blood films but no findings are recorded.

Of *filariasis* 317 cases were notified and 4 deaths were ascribed to this cause. The Medical Officer No. 4 District reports the disease as "fairly common" in his district.

Influenza gave rise to 557 cases and was the cause of 3 deaths. 128 cases of *measles* were reported. No case of *smallpox* is recorded, but during the year 794 vaccinations were carried out.

A considerable decline in the incidence of *enteric fever* is noted, only 72 cases being notified as compared with 250 in the preceding year. It is said that 4 deaths were ascribed to the disease but the Cunningham Hospital Returns show that among 21 in-patients treated, 5 deaths occurred. Attention is called to the fact that District Medical Officers fail to make full use of the Laboratory services available: in only 6 out of the 72 cases of enteric fever were specimens of blood submitted for serological diagnosis. Of these 6 specimens 5 agglutinated *Bact. typhosum* and 1 *Bact. paratyphosum A*. *Dysentery* was responsible for 139 cases and 4 deaths but in six out of the seven Reports of District Officers the incidence of *enteritis* is commented upon. In District No. 3 alone out of 278 cases recorded with 12 deaths, 177 of the cases and all the deaths occurred among children under two years of age. The fly nuisance is held to be mainly responsible for the disease which is also referred to as *summer* or *fly diarrhoea*.

Tuberculosis is responsible for 38 per cent. of the total deaths due to all causes in the Presidency and returns the highest mortality rate for any individual disease. During the year 148 cases with 61 deaths were notified. Greater facilities for the treatment of the disease are an urgent necessity and it is suggested that the unroofed Quarantine Station (see this *Bulletin* 1933 Supp. p. 260*) would provide a reasonable anti-tuberculosis centre. *Pneumonia* which is the second most serious cause of mortality gave rise to 83 cases and 45 deaths.

Helminthiasis —It is said that infection with *ascaris* appears to be the rule rather than the exception amongst children of the lower classes. The majority of the District Medical Officers comment upon the high incidence of round-worm infestation among children, while the Medical Officer No. 4 District also observes that the residents in one area are heavily infected with *ankylostomiasis*.

Of leprosy 19 cases and 8 deaths were reported. The usual report on the work at the Leper Home is contributed by Dr G D McLEAN the following details are supplied —

Sex	Admitted	Treated	Died	Discharged	Remain
Male	2	32	5	2	25
Female	2	19	3	—	16
Totals	4	51	8	2	41

In addition 22 *extern lepers* were regularly visited and treated at their homes.

Veneral Diseases —Recorded cases of *syphilis* numbered 878 and 39 deaths were ascribed to the disease. 743 cases of *gonorrhoea* were also reported. The Report observes that there are good reasons for believing that these figures do not represent the true incidence of venereal diseases in the Presidency. The majority of District Medical Officers comment upon the incidence of these diseases in their respective areas and especially of the incidence of congenital *syphilis* in young children (see also *Maternity and Child Welfare Work* above). The Medical Officer No 4 District reports ten cases of *climatic bubo* and 2 of *granuloma venereum* in the District and says that *gonorrhoea* and *syphilis* are especially evident at the time of the return of the schooners from San Domingo with their complement of labourers who have been working on the sugar estates adding that contact with the Republic (of San Domingo) has certainly been responsible to a great extent for the incidence of venereal diseases here. During the year 1 208 cases of *jaund* were dealt with.

At the Bacteriological Laboratory where the Kahn test is the serological standard adopted for the diagnosis of *syphilis* 363 such tests were carried out. 122 gave positive and 21 doubtful reactions. It is noted that the Medical Officers of Districts 2 and 6 submitted no less than 320 of the specimens for examination.

Other Diseases —The classified Returns of the Cunningham Hospital show 29 cases of *cancer* with 5 deaths. the Medical Officer No 2 District states that *carcinoma* is definitely on the increase among all classes and races of the population and that cases of *carcinoma* of the tongue breast uterus and bladder were seen during the year. *Ulcers* are common. the Medical Officer No 7 District estimates that 25 per cent of the school-children in that area suffer from *ulcers*. At the Cunningham Hospital 36 in-patients were treated for the condition at the Alexandra Hospital 23 at the Pogson Hospital 8 and at the Cottage Hospital 3 (see also this *Bulletin* 1938 Supp p 262*).

Scientific —At the Bacteriological Laboratory 544 specimens were examined and reported upon. The 363 Kahn and 6 Widal tests have already been mentioned under the headings of *venereal diseases* and *enteric fever* respectively. No other findings are recorded in the section entitled Report of the Bacteriological Laboratory. The Medical Officer No 8 District sent among other specimens 3 of human sputum one of which proved to be positive with *Mycobacterium tuberculosis*.

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Excellent work is carried out by the District Nurses who are all trained midwives with a knowledge of the proper care and management of newly born infants. They attend confinements in the rural districts and advise mothers as to the proper care and upbringing of their babies.

The Baby Welfare League continued to function with success but its scope and usefulness is greatly restricted owing to lack of funds. *The Child Welfare Clinic* continued to be held weekly at the Colony Hospital, St. George (see this *Bulletin* 1938 Supp. p. 264*). It is noted that during 1937 diseases of early infancy were responsible for 150 deaths and of these 126 were ascribed to *marasmus*. Parental ignorance and neglect, plus the high percentage of illegitimate births are the principal causative factors.

School Hygiene—In seven of the eight Districts 18 498 school children were medically examined during the year. Among 4 783 children showing defects of one kind or another 1 440 required treatment for *intestinal parasites* 1 087 for *dental defects* 871 for *skin affections* 542 showed *enlarged tonsils* 387 were affected with *scabies* 137 with *yaws* and 124 were suffering from *malaria*. The children are examined at four monthly intervals throughout the year in order to continue this work with maximum efficiency the appointment of a full time School Medical Officer is again recommended (see this *Bulletin* 1938 Supp. p. 265). School-children suffering from dental defects receive free treatment at the *Dental Clinic* at the Colony Hospital during the year under review 772 children were dealt with. Elementary hygiene is taught in all schools and during the usual *Annual Health Week* lectures were given by members of the Education and Medical Departments on suitable health subjects.

Public Health Sanitation etc—The year under review was marked by an unusually long dry season. The Colony was free from such major infections as smallpox, plague, etc. but a few cases of poliomyelitis were notified, while a widespread epidemic of whooping cough with some severe cases was recorded. Sanitary Inspectors continued their routine *anti-malarial* control duties, the work being considerably extended in the remote rural districts in an effort to teach the people how to reduce the incidence of mosquitoes in their areas.

With regard to *sewage disposal* work was commenced on the installation of a water borne system in the town of St. George and considerable progress with this work is reported. The poorer houses in rural areas have no latrine accommodation whatsoever and steps are being taken with a view to introducing the bored hole type of latrine in sufficient numbers to meet the needs of the rural population throughout the Island. In the larger towns *refuse* is disposed of by incineration and it is hoped that similar methods of disposal will be adopted in the smaller townships. No further *water supplies* were installed, but it is hoped that piped-supplies can be extended to districts as funds permit. In the Island of Carriacou water shortage sometimes assumes serious proportions until the arrival of the heavy rains in October.

A commission was appointed to enquire into the economic and living conditions of the *labouring classes* and a memorandum on the economic condition of labourers was submitted to Government by the Senior Medical Officer. In the towns the District Boards are responsible for

housing and town planning but in the rural areas where housing conditions are far from satisfactory there appears to be no controlling authority. These matters are receiving careful consideration with a view to steps being taken to effect improvements.

The control of *food supplies* continued to be exercised especially in regard to milk and milk vendors. The new slaughter house meat and fish markets were formally opened and brought into use during the year. The staff of Sanitary Inspectors continued to carry out their varied routine duties and a detailed record of the year's work is supplied. The post of Chief Sanitary Inspector is still unfilled and this vacancy to some extent diminishes the efficiency of the work for which the staff is responsible.

The training of Sanitary personnel was carried on as opportunity occurred. Four Inspectors sat for the examination of the Royal Sanitary Institute but results were not to hand prior to the issue of the Annual Report.

Port Health Work—No diseases under the Quarantine Regulations gained entry to the Colony during the year. Vaccination of passengers surveillance and disinfection of baggage were carried out when deemed necessary.

Hospitals Dispensaries etc—There are 3 *General Hospitals* 7 *Dispensaries* and 18 *Medical Visiting Stations* in the Colony. The Medical Visiting Stations are staffed by a resident nurse who is also a trained midwife and are visited at least once each week by the Medical Officer of the District. These nurses treat minor ailments and injuries attend confinements assist Medical Officers with the sick in the medical inspection of school-children and the giving of injections etc. At these Visiting Stations 643 confinements were attended 1 027 infants visited in their homes and 1 453 general nursing cases dealt with during the year. Attendances at the various hospitals dispensaries and visiting stations for treatment numbered 16 697. The record of work dealt with at hospitals and other institutions is given below—

Institution	Admitted	Treated	Died
Colony Hospital	2 058	2 120	82
St. Andrews Hospital	375	382	5
Carnacou	232	245	10
Mental	48	202	8
Tuberculosis	44	57	41
House of Refuge	—	171	22
Prison Infirmary	40	40	—
Lepet Settlement	—	14	—

The training of probationer nurses was continued by the Resident Surgeon Matron and Senior Sisters at the Colony Hospital.

Recorded cases of *malaria* numbered 9 411 with 83 deaths. These figures are the lowest noted during the past three years. Incidence is less in all but two districts and the decline is attributed to the success of anti malarial work undertaken. At the Colony Hospital 85 in-patients were treated with 4 deaths at St. Andrew's Hospital 3 with 1 death and at Carnacou Hospital 497 with 6 deaths with the

exception of 5 subtertian cases in the Colony Hospital, types of infection were not differentiated.

No case of *smallpox* has been recorded for many years, but the population is adequately protected by compulsory vaccination regularly carried out.

There was a marked decrease in the number of cases of *enteric fever* and for the first time for many years no case was recorded in the town of St George nor in District V nor for the second consecutive year in District IV. Altogether 19 cases with 9 deaths were reported, all were treated as hospital in patients, and in addition 372 contacts received T.A.B. inoculation. *Dysentery* is a notifiable disease and during the year 36 cases with 1 death were notified. In the Island of Carriacou the long dry season followed by torrential rains, by washing the soil into collecting tanks and drinking ponds brought about a severe outbreak of *dysentery and enteritis*. Of the 36 cases of dysentery recorded 31 occurred in Carriacou, and in the Colony as a whole 2 195 cases of *diarrhoea and enteritis* with 145 deaths were recorded.

During the year 79 cases of *pulmonary tuberculosis* were notified, but 83 deaths were ascribed to this cause. Forty four patients were admitted to the new Tuberculosis Hospital, where 57 patients were treated and 41 died. The disease appears to have increased steadily in recent years. Examination of all contacts is to be undertaken and it is hoped that by this means cases will be detected in the early curable stages so that in time incidence will be reduced.

The prevalent *helminthic diseases* throughout the Colony are *ascariasis* and *ankylostomiasis* but the latter infestation does not occur among the natives of the Island of Carriacou. This freedom from the disease in Carriacou is ascribed to lighter rainfall and different type of soil. Definite action to improve rural sanitation is under consideration, meanwhile educational campaigns aim at the instruction of the people in sanitary measures directed to the eradication of helminthic infestations. The following Table sets out the 1937 experience in connexion with these diseases —

Parish	Medical District	Ascariasis	Ankylostomiasis
St George	I	Cases 1,520	Cases 1,057
St John	II	1,467	418
St Mark	III	6,328	299
St Patrick	IV	1,387	40
St Andrew	V	4,272	1 724
	VI	3,269	153
St David	VII	1,657	543
Carriacou	VIII	1,514	11†
Totals		20 414	4,287

† All imported

Two new cases of *Leprosy* were reported. There were 14 patients in the Leper Settlement 11 of whom were males (see this *Bulletin* 1938, Supp. p 267*)

Veneral Diseases—Cases of syphilis treated during the year numbered 772 a sharp increase of 249 cases over the 1936 record 48 deaths were ascribed to this cause. For gonorrhoea 1 122 persons were under treatment 18 being treated as hospital in patients. This condition also shows increased incidence by comparison with 1936 experience. It is stated that venereal diseases are increasing owing to the ineffectiveness of present methods of treatment and that to deal adequately with the problem a Venereal Diseases Clinic should be established. An increase is also recorded in the incidence of yaws for 2,142 cases were treated as against 1,399 in the preceding year. District Medical Officers are of the opinion that recent cases of the disease are responding less satisfactorily to N A B and that possibly a resistant strain of *S. pertenues* is being encountered. Treatment with other arsenicals is to be tried out.

Other diseases—The report under review mentions a long continued and widespread epidemic of whooping cough with some severe cases that mumps was also moderately prevalent and that influenza with and without bronchial symptoms was fairly prevalent. Hospital returns mention 8 non fatal cases of whooping cough none of mumps and one case of influenza but there were 82 in patient cases of bronchitis with 5 deaths and 34 of pneumonia with 10 deaths but in the Colony as a whole these two titles were responsible for 37 and 47 deaths respectively.

Cancer and other malignant tumours caused the deaths of 39 persons in 1937.

Financial—Total expenditure on Medical and Sanitary Services during 1937 amounted to £23 792 a sum representing 13·4 per cent of the total revenue of the Colony during the same year.

St. Lucia (1937)

The Colony of St. Lucia is the largest and most northerly of the Windward Islands in the Lesser Antilles group West Indies. It is 27 miles long and 14 miles broad, and has an area of 238 sq miles or slightly larger than the Isle of Man.

Vital Statistics—The relevant facts read as follows —

Estimated Population	Registered Births	Birth Rate	Registered Deaths	Death Rate	Infant Deaths	Infant Mortality Rate
67 404	2,216	32·9	999	14·4	224	101·1

There was a further decline in the death rate but a slight increase in the infant mortality rate by comparison with 1936 experience.

Maternity and Child Welfare Work—The Maternity and Child Welfare Centre in Castries is reported to have performed valuable work throughout the year the work continued to be administered as previously described (see this *Bulletin* 1938 Supp p 267*). Dr H P S GILLETTE Medical Officer No 1 District, applauds the work of the Centre and observes that incorrect infant feeding is a common

contributory cause of infant mortality. In rural areas the Government Nurse and Midwife in each village attends to maternity and child welfare work. It is the intention of Government to extend these services. No details are supplied of the work at the Centre in Castries nor of the work carried out in rural areas but the Obstetric Returns of the Victoria Hospital record 709 cases dealt with in the Maternity Ward, 819 deliveries 6 maternal and 13 infant deaths.

School Hygiene—School premises were regularly inspected by Government Medical Officers and Sanitary Inspectors. School Managers are allowed a small Government subsidy to assist in maintaining in a sanitary condition the latrines at schools under their control. The Medical Officer No 2 District Dr J le V BRISTOL observes that dietary deficiencies are reflected in the condition of the school-children in his District. Free dental treatment for children under 12 years of age is available at the Victoria Hospital. Steps have been taken to extend this service to three other districts.

Public Health Sanitation etc—Throughout the Colony the general health of the population remained satisfactory during the year. The usual routine anti-malarial measures continued to be carried out. These are described in detail by the Chief Sanitary Inspector in his Annual Report which is presented as an Appendix to the Report under review. Methods of *sewage disposal* remain unchanged (see this Bulletin 1936 Supp. p. 253*). In Castries and near villages the arrangements though primitive are effective but in the rural areas where few dwellings possess a latrine of any description conditions are very unsatisfactory. There is no central pipe-borne water supply in the Colony: each town or village has its own small plant and in some cases these are unsatisfactory. A survey of the most dangerous of them was carried out during the year by the Colonial Engineer and the Senior Medical Officer and recommendations for improvements were submitted to Government. With a near prospect of augmenting the water supply in Castries it is hoped that the installation of a water-carriage system for the disposal of excreta will be possible. The only other reference of any consequence to *water supplies* is contained in the Report of Dr M A BYER No 5 District. Dr Byer states that the village of Dennery had a constant supply of very good water throughout the year and adds that the Dennery Water Authority is taking steps to enclose the whole area of the Water Works and so ensure adequate protection of supplies. *Housing* conditions in Castries are not altogether satisfactory. Model cottages built from funds supplied from the Colonial Development Fund are let to persons of the labouring classes at low rentals. Housing in the rural areas is described as "deplorable". So far as the chief *Sugar Estates* are concerned, great improvement in housing and sanitation is reported. Excellent houses of concrete have been built with adequate and well constructed sanitary arrangements and at Roseau a pipe-borne water supply has been installed for the use of the labourers.

Dietary deficiencies are commented upon by most of the District Medical Officers. Government has appointed a Standing Committee to investigate the position with regard to nutrition and take steps to bring about improvement. Numerous small *dairies* exist round Castries and milk supplies are frequently taken and examined. Meat and milk do not commonly figure in the diets of the people at large.

The Senior Sanitary Inspector contributes his usual detailed report of the work of his Department (see this *Bulletin* 1938 Supp p 263*)

Port Health Work—Forty five ships the majority of them from South American ports entered Castries port during the year and were given pratique. No quarantine restrictions were recorded nor was any case of quarantinable disease reported.

Hospitals Dispensaries etc—Various improvements to the building and equipment of the Victoria Hospital were carried out during the year. In patients numbered 2 693 and 113 died. In their separate Reports District Medical Officers frequently refer to the number of out patients treated in their areas but the only established dispensaries mentioned seem to be the Castries Dispensary where 4 889 cases were seen during 1937 and three dispensaries in No 5 Medical District where 7 682 cases were dealt with. The notes which follow summarize the principal reference to morbid conditions dealt with during the year.

Malaria continued to be prevalent especially in areas near marine swamps. *A. tarsimaculatus* is the carrier in the Colony and breeds freely in brackish water until the percentage of sea water reaches 70. A fresh water breeder *A. argyritarsis* is also found but so far it has not been proved that this mosquito is a carrier of malaria (see this *Bulletin* 1936 Supp p 254* and 1937 Supp p 263*). In patient cases numbered 84 with 7 deaths. 3 of the cases were *benign tertian* infections 3 were *quartan* and 78 were unclassified. (The Laboratory Report shows that among 117 blood films examined 31.6 per cent contained *subtertian* parasites 2.5 per cent *benign tertian* and 2.5 *quartan*.) Cases treated at all dispensaries totalled 8 527 the majority of them (4 235) in District 4 and only 408 in District 1 (Castries). The incidence of the disease in District 4 is described as having assumed alarming proportions.

Of *enteric fever* 37 cases were notified—all were sporadic occurring in various parts of the Colony (see *water supplies* above). It is stated that all contacts were inoculated with T.A.B vaccine and in every case the patient was removed to Hospital. Hospital Returns show only 33 cases of which 30 were typhoid with 10 deaths and 3 were non fatal cases of paratyphoid. At the Laboratory 3 specimens of blood serum were submitted to the Widal reaction test but results are not recorded.

No cases of *amoebic dysentery* have been reported for the past two years. No exact figures of the incidence of *bacillary dysentery* are available though it is stated undoubtedly there were some cases during the year.

Forty three cases of *pulmonary tuberculosis* were notified—the disease would appear to be more prevalent than statistics suggest for many cases are believed to pass unrecognized because of ignorance of the people and lack of adequate organization to combat the scourge. District Medical Officers comment upon poor housing conditions and overcrowding. At the Laboratory where 10 specimens of sputum were examined 1 was positive with *Mycobacterium tuberculosis*. The high incidence of *other respiratory diseases* is mentioned *bronchitis* was responsible for the deaths of 55 persons during the year.

Helminthic Diseases.—During the year 7 763 patients were treated for various helminthic infections these cases were diagnosed

clinically so the accuracy of the data is open to question. *Hookworm* is said to be "widespread through the Colony. The damage caused by this disease is not as great as was formerly believed for laboratory diagnoses have shown that many cases of *anaemia* and debility formerly ascribed to hookworm, have been proved to be due to malaria. *Round-worm* infestations are common in all members of the labouring classes.

Four cases of *leprosy* were admitted to the Leper Asylum 6 patients died and at the end of the year there were 25 inmates.

Veneral Diseases—From the five Districts 1 031 cases of *syphilis* were reported and at the V.D. Clinic in Castries 247 cases were seen and treated of *gonorrhoea* 1 834 cases were reported from the Districts and 98 cases were dealt with at the V.D. Clinic. At the Victoria Hospital 57 in-patients were treated for *syphilis* 15 for *gonorrhoea* and 38 for other venereal diseases.

Cases of *yaws* reported during the year numbered 508. Treatment along intensive lines was continued the disease appears to be declining steadily and the belief is expressed that shortly *yaws* will cease to exist in the Colony.

Other diseases commented upon in the Report under review include the following. *Nutritional diseases* were responsible for 57 deaths, and *diarrhoea and enteritis* for 53 deaths in the Colony as a whole. *Ulcers and skin diseases* are common.

Scientific—At the Laboratory 1 225 specimens of various kinds were examined. Some of these have been quoted in the preceding notes as regards the remainder no findings are recorded.

Financial—Total expenditure on Medical Department services during 1937 amounted to £10,993 as compared with approved Estimates of £11,208.

St. Vincent (1937)

The West Indian Colony of St. Vincent includes the Island of St. Vincent, the second largest of the Windward Islands, and five of the Lesser Grenadines a chain of islands lying between Grenada and St. Vincent. The island of St. Vincent is 18 miles long and 11 miles broad and has an area of 133 sq. miles, or nearly that of the Isle of Wight the total area of the five smaller islands is some 17.3 sq. miles.

Vital Statistics—The estimated population at the end of the year was 57,526. *Registered births* numbered 2,317 and *deaths* 878 the resulting crude birth and death rates being 40.3 and 15.3 per 1 000 respectively. *Infant deaths* numbered 273 giving an infant mortality rate of 117.8 per 1 000 live births. There were 89 *stillbirths*. Vital facts are summarized in an admirable series of Tables in the Report under review. In a Table presenting the principal causes of death during 1937 it is observed that *sexility* was the certified cause of 99 deaths, *mucosus* 69 *congenital debility* 61 and *ascorbiy* 54. The number of deaths ascribed to the latter cause is exceptionally high.

Maternity and Child Welfare Work—At the Colonial Hospital, Kingstown, 398 labour cases were dealt with of these 339 were normal confinements with 352 babies born alive. Six maternal deaths were recorded. At the Georgetown Hospital, there were 2 normal labour cases and at the Chateaubelair Hospital 8. There are 11 District

Nurse Midwives in the Colony during the year this staff saw 642 expectant mothers attended 261 midwifery cases and paid 10 778 visits to the homes of patients. At the *Ante Natal Clinic* at the Colonial Hospital 92 women attended for advice and treatment.

The *Child Welfare Clinic* continued to function successfully with the Matron of the Colonial Hospital in charge. A nurse qualified in general nursing was appointed to assist and will first undergo a special course of training. New cases registered numbered 132 and attendances recorded totalled 449 during the year.

Four *pupil midwives* trained in the Maternity Ward of the Colonial Hospital, Kingstown passed the Midwives examination.

School Hygiene—There are 37 primary schools in the Colony with 10 223 pupils on the registers. During the year 36 of the schools were visited by District Medical Officers and 5 424 children were medically examined when 14.8 per cent showed dental defects, 6.3 per cent skin diseases (other than scabs), 2.4 per cent signs of anaemia and malnutrition and 1.1 per cent were suffering from vawa (see this *Bulletin* 1938 Supp. pp. 270*-271*). Investigations into conditions of malnutrition among school-children were commenced in co-operation with the Department of Education.

A *Dental Clinic* was inaugurated in April 1937 to provide free dental treatment for school-children and for persons who cannot afford to pay. Between April and the end of the year 1 156 patients had received treatment, 414 of them being school-children.

Public Health Sanitation, etc.—The Report observes that on the whole the state of public health during the year under review was well maintained throughout the Colony. Routine *anti malarial measures* continued to be carried out regularly throughout the Colony. Progress is reported in improving conditions concerned with *sewage disposal*. The inadequacy of *water supplies* is again a subject of comment (see this *Bulletin* 1938 Supp. p. 271*). In Kingstown with its increasing population making a more liberal use of water for sanitary and domestic purposes the situation becomes urgent. On the Leeward Coast villages continue to draw their supplies from springs which during the dry months yield very little water. *Housing* conditions of the wage-earning population are not satisfactory; houses are small and overcrowding is fairly general. Rentals of Government built cottages at Chateaubelair were reduced to bring them within the reach of the lowest paid labourers. Though the majority of proprietors of *estates* have discontinued the erection of houses for their labourers, the Orange Hill group of estates continues to provide unusually good housing for their employees. Good houses of the cottage type suitable for occupation by persons of the peasant class are available in the various Land Settlement areas in the Colony. Services concerned with the sanitary control of articles of food and drink were continued. Details of this work are set out in a series of tabulated statements (see this *Bulletin* 1938 Supp. p. 271*).

A course of lectures and demonstrations covering a period of 15 weeks was given primarily for persons desirous of qualifying as *Sanitary Inspectors*.

Port Health Work—No ports were quarantined during the year. Owing to an outbreak of *acute poliomyelitis* in a neighbouring Colony passengers arriving from that territory were medically examined.

before being allowed to land 49 vessels were boarded and 501 passengers examined. Arrivals at and departures from Kingstown were 2,847 and 3,217 respectively.

Hospitals Dispensaries etc.—The Union Island Hospital (4 beds) which also serves Canouan and Mayreau, was opened in February 1937. In May 1937 patients were transferred from the Old Mental Hospital at the Fort to the new Mental Hospital at Calliaqua. The following Table summarizes the volume of work dealt with during the year at various Government Institutions—

Institution	In-patients Treated	Hospital Deaths	Out patients
Colonial Hospital, Kingstown	1,568	101	Attendances 6,867
Georgetown Hospital	66	3	?
Chateaubelair	134	3	?
Union Island	43	4	?
Tuber House Sanatorium	13	2	?
Mental Hospital	96	6	?
Pauper Asylum	79	13	?
Lepet Settlement	17	1	?

At the 13 *Dispensaries* and 51 *Out-patient Stations* in the Colony 62,781 attendances for treatment were recorded.

The training of nurses was continued at the Colonial Hospital, Kingstown and two probationers passed the qualifying examination (see this Bulletin 1938, Supp. p. 272*).

The notes which follow briefly refer to the principal items of morbidity experience mentioned in the Report under review.

A further decline in the incidence of *malaria* is observed. 376 cases were notified, the lowest recorded experience during the past five years. As in previous years District 2, South, was responsible for the highest proportion of notified cases 42 per cent. of the total recorded. In the Colony as a whole 8 deaths were ascribed to this cause. Only 13 in-patient cases appear to have been dealt with—these were all *benign tertian* infections and treated at the Colonial Hospital, Kingstown. At the newly established Bacteriological Laboratory 51 blood films were examined for the presence of *malaria* parasites—all gave negative findings.

Of *enteric fevers* 25 cases and 8 deaths are said to have been notified, but the classified returns show that 26 cases of typhoid with 8 deaths and one case of paratyphoid A were treated at the Kingstown Hospital, and one case of typhoid at the Georgetown Hospital. The age-group 10-20 provided the greatest number of cases. Only one case of *dysentery* (type not specified) was notified during the year yet two patients suffering from *amoebic dysentery* were admitted to the Kingstown Hospital. Among 40 faecal specimens examined at the Bacteriological Laboratory 3 were positive with cysts of *E. histolytica*. In all hospitals and dispensaries 1,423 cases of *diarrhoea and enteritis* were treated. 876 of the cases occurring among children under 2 years of age.

Notified cases of *tuberculosis* (all forms) numbered 38 and of these 32 were cases of the *pulmonary* form of the disease—all the 27 deaths

ascribed to the disease were from pulmonary tuberculosis. To the Tuberculosis Sanatorium 8 female patients were admitted and 2 died. Other respiratory affections treated during the year included 2 776 cases of bronchitis (31 deaths) and 55 cases of pneumonia (40 deaths). Six out of 18 specimens of sputum examined were positive with *Mycobacterium tuberculosis*.

Cerebral Diseases—For syphilis 81 persons received treatment as hospital in patients while 461 patients were treated at the dispensaries etc. Gonorrhoea and its complications was responsible for 53 hospital in patient cases and 706 cases received dispensary treatment.

The incidence of yaws appears to be decreasing steadily during the year 5 117 new cases were seen while out of 9 874 cases treated 3 751 were discharged as clinically cured.

No mention is made in the text of the Report to the incidence of helminthic diseases but it is noted that no fewer than 10 515 cases of ascariasis were treated. Mortality was high for 52 deaths were certified under this title. Hospital in patients treated for ascariasis numbered 8 and for ankylostomiasis 5 (see this Bulletin 1938 Supp. p. 273*).

Other diseases treated during the year included the following—
Influenza was prevalent throughout the year. 2 181 cases were recorded with 9 deaths. Tetanus was responsible for 13 cases and 6 deaths. Whooping cough for 93 and measles for 8 non fatal cases.

Once again attention is called to the fact that there is a lack of agreement between statements made in different parts of the Report (see this Bulletin 1938 Supp. pp. 272*-273*). In addition to the examples given in the preceding notes the following may be mentioned—

Page 5 pneumonia 55 cases 40 deaths. Table 4 41 cases 25 deaths.
tuberculosis 38 cases 27 deaths. Table 5 32 cases.

6 23 deaths ascribed to syphilis. Table 4 gives 17 deaths.
5 8,874 cases of yaws treated. Table 4 mentions 5,357.

Scientific—The new Bacteriological Laboratory (see this Bulletin 38 Supp. p. 271*) was brought into use in May 1937 and from then the end of the year 437 specimens of various kinds were dealt with.

Financial—Total expenditure on Medical and Sanitary Services for 1937 amounted to £17 095 a sum which represents 18 per cent. of the total revenue of the Colony for the same year.

TRINIDAD AND TOBAGO (1937)

Trinidad (area 1 864 sq. miles) is the most southerly of the West Indian Islands lying about 16 miles off the coast of Venezuela in latitude 10° N. Tobago (area 118 sq. miles) is some 21 miles north-east of Trinidad.

Vital Statistics—The relevant facts supplied by the Registrar-General are as follows—

Estimated Population 31st Dec 1937	Registered Births	Birth Rate	Registered Deaths	Death Rate	Infant Mortality Rate
456 043	14,226	31.5	7 843	17.4	120.5

[Of the total population 154 083 were East Indians. The East Indian birth rate was 40.9 and the death rate 19.3 per 1 000.]

Maternity and Child Welfare Work.—At the *Colonial Hospital Port-of-Spain* 1,331 new cases attended the ante-natal clinic and recorded 6,214 attendances. Total admissions to the maternity section numbered 928 and of these 702 were normal confinements. 428 cases were delivered in the district by the hospital nursing staff. At the *Colonial Hospital San Fernando* 601 new cases attended the ante-natal clinic and recorded 1,952 attendances. Cases admitted to the maternity section numbered 435 and in addition 63 cases were delivered in the districts. The *Colonial Hospital Tobago* records 185 admissions to the maternity section and of these 148 were normal confinements.

Eight candidates from the Colonial Hospital, Port-of-Spain and 3 from the Colonial Hospital, San Fernando were successful in passing the *Midwifery Examination*.

Child Welfare Work continued to be carried out at the 14 district branches and 20 clinic centres maintained by the Child Welfare League (see this *Bulletin* 1933, Supp. p 274*).

School Hygiene.—The appointment of two School Medical Officers, one for the northern and one for the southern division, led to a new scheme of medical inspection, and a considerable extension of school medical services. It is hoped, with the assistance of District Medical Officers, to provide for the medical inspection of all school-children in the Colony. The new scheme provides for the examination of children in each school in four age-groups and for their examination at least three times during their school life. The year's work is set out in great detail: a brief summary reads as follows. In the *Northern Division* 29 schools visited, 4 178 children examined, 3 178 found with defects. In the *Southern Division* 22 schools visited, 3 142 children examined, 2,806 with defects. The principal defects noted were, carious teeth, malnutrition enlarged spleens, glands and tonsils, skin diseases. The large percentage of children exhibiting various defects suggests that some measure of control of the child of pre-school age (2-5 years) is necessary.

Public Health Sanitation, etc.—In order to meet the requirements of the reorganized service (see this *Bulletin* 1936 Supp. p 253* 1937 Supp. pp 268-269* and 1938, Supp. p 275*) a number of additional appointments to the staff of the Health Department were made during the year: these are referred to in various sections of this Summary.

Considerable attention continued to be devoted to anti-malarial work. It is said that data are now becoming available showing the monthly incidence of malaria in each district of the Southern Division. In addition to the usual routine measures undertaken, special works included the regrading and filling of low-level areas clearing and drainage works drain constructions and anopheline surveys.

For all practical purposes methods of *sewage disposal* remain unchanged. It is noted that a survey was completed during the year having in view the installation of a water-borne sewage system for the town of San Fernando and that on oil fields and estates water sewage systems are generally being adopted. During the civil disturbances in June 1937 when such essential health services as the emptying of

buckets and cesspits etc. were temporarily at a standstill in many places hospitals and institutions were unaffected and where water borne systems were installed on oil fields and estates, these functioned with complete satisfaction

The further extension of *water supplies* from the Central Water Supply Scheme was undoubtedly effective in preventing epidemic outbreaks during an abnormally long dry season in 1937. A large number of new areas in the Northern Division were served during the year but fewer in the Southern Division where there still remain areas drawing their supplies from sources considered inadequate and unsafe.

The *housing problem* has been a preoccupation of the Health Department for a number of years and while the difficulties associated with rural housing have rendered progress necessarily slow appreciable advance is reported in certain areas. The Report supplies a series of photographs typifying insanitary houses and barracks formerly existing and the new types which are gradually replacing them. Model villages were laid out in nine areas and others are envisaged. The appointment of a *Town Planning Adviser* was made towards the end of the year to meet the need for the systematic planning both of urban and rural areas (see also this *Bulletin* 1938 Supp. p 275*)

Under the heading of *labour conditions* the disturbances of June 1937 are mentioned their effects upon public health services the casualties dealt with and the sanitary conditions of the various military camps which had to be established.

The usual inspections and control of *foodstuffs* in shops and markets were satisfactorily carried out by the Sanitary Inspectors. Preliminary work on the determination of the *diets* of the people indicates a general lack of vitamins and first-class proteins but though early malnutrition states exist evidence does not point to widespread establishment of deficiency diseases (see this *Bulletin* 1938 Supp. p 275*)

The usual measures were taken to spread a knowledge of *hygiene and sanitation* among all classes of the community.

Port Health Work—No change was made in existing arrangements for the performance of duties concerned with maritime or aerial traffic (see this *Bulletin* 1938 Supp. p 276*) The following statement summarizes the year's work —

Ships Arriving	Ships Visited	Passengers and Crews	Persons Inspected	Persons under surveillance	Persons Vaccinated
353 Steam 879 Sall	342 878	21 348 4 657	21 348 } 4 657 }	240 (Smallport)	851

Hospitals Dispensaries etc—Attention is again called to the serious overcrowding in the Colony hospitals. The Colonial Hospital Port-of-Spain is equipped with 403 beds but the daily average number of patients was 422, while at the San Fernando Hospital of 194 beds the daily average of patients numbered 235. To relieve conditions expansion of Out patient Dispensaries was effected to permit of earlier discharges from hospitals of cases suitable for outside treatment.

Two new ward blocks capable of accommodating 96 patients approach completion at the Colonial Hospital, Port-of-Spain and various minor works were carried out at the hospitals at San Fernando Tobago and Princes Town. Other work to be undertaken includes additions to the Nurses Home and construction of a general administrative casualty block at the Port-of-Spain Hospital.

The facilities available for the isolation of cases of infectious diseases are inadequate and unsatisfactory and requirements can only be met by the provision of an Isolation Hospital with a trained nursing staff.

Two Ward Sisters and 14 Nurses were appointed during the year for service in the Colonial and District Hospitals.

A new syllabus of work was drafted for use in the three Nurses Training Schools in Port-of-Spain, San Fernando and Tobago with a view to securing uniformity of training and examination standards. The following successes were recorded at the annual examination for nursing certificates —

	1st year	2nd year	3rd year
Colonial Hospital Training School, Port-of-Spain	15	7	7
San Fernando	8	7	12

In the following Table are summarized details as regards bed accommodation and the volume of work dealt with in the various hospitals in the Colony during 1937 —

Institutions	Beds	Admitted	Treated	Died
<i>Colonial Hospitals —</i>				
Port-of-Spain	403	9 049	9 478	1 067
San Fernando	194	6 438	6 680	632
Tobago	78	1 467	1,525	90
<i>Six District Hospitals</i>	227	4 818	4,883	428
Mental Hospital	636	282	1 000	112
Lepet Asylum	400	78	458	29
House of Refuge Trinidad	700	456	1,044	259
Tobago	50	33	82	20
Three Emergency Hospitals	14	?	223	?

At the Ophthalmic Clinics of the Colonial Hospitals in Port-of-Spain and San Fernando 2,683 cases were treated. Large numbers of patients were treated at the Out-patient Departments and special clinics attached to all Hospitals. In addition at the 78 Health Offices (Dispensaries) established in the 18 Medical Districts of Trinidad 168,210 patients, and at the 16 dispensaries in the three Medical Districts of Tobago 7 686 patients were dealt with.

In spite of the occurrence of epidemics the general health of the Colony during 1937 is reported to have been satisfactory. The text of the Report under review discusses at varying lengths the principal items of morbidity and from these commentaries the following summaries have been prepared.

There was the usual seasonal incidence of *malaria* but the number of cases, 18,518, was less than in 1936. The disease is not notifiable

and the figures are necessarily incomplete. Microscopical diagnosis is not possible in many cases but among the 1,323 hospital in-patients treated during the year 577 were *benign tertian*, 4 *quartan*, 215 *subtertian*, 12 *malarial cachexia*, 8 were cases of *blackwater fever* and in 507 cases the nature of the parasite was not determined. [In the section discussing *malaria* on p. 15 of the Report under review a gross error characterizes the statement of admissions and deaths from malaria. The figures quoted relate to admissions and deaths due to all causes.]

At the Laboratory where 1,570 blood films were examined 324 contained malaria parasites and of the positives 267 were *P. falciparum* (16 with crescents), 51 *P. vivax* and 3 *P. malariae*.

No case of *yellow fever* or *smallpox* was reported and *smallpox* vaccination was continued.

Reported cases of *influenza* numbered 3,263 and 95 deaths were ascribed to this cause. The disease is not notifiable therefore the figures are incomplete. Incidence was highest from October to December when the number of cases constituted a small epidemic. The distribution of cases in Trinidad was Northern Division 1,307 Southern Division 1,699 and Tobago 257.

An outbreak of a mild type of *anterior poliomyelitis* occurred at the beginning of the year and continued to May. The disease had been reported from Venezuela towards the end of 1936 (4 cases occurred in Trinidad between September and December 1936) and it is possible that the infection was imported for there is a continuous interchange of persons and cargo between Venezuela and Trinidad. On the other hand it is to be remembered that a few cases occur each year in Trinidad during the wet season. During 1937 there were reported 102 cases and 6 deaths. The larger towns were chiefly affected but before the outbreak died out cases had occurred in all districts. 53 cases were reported from northern districts of Trinidad, 47 from the southern districts and 2 from Tobago. Over 80 per cent. of the patients were in the 0-5 age group. The epidemic is described at length in the Report under review.

Two outbreaks of *enteric fever* occurred during the year, one at Roxborough in Tobago in the early months of 1937 and the other at San Juan Trinidad in July-September, altogether 665 cases. Forty-three per cent. of these were children aged 5-15 years and 116 deaths were notified. The Roxborough epidemic gave rise to 76 cases of a mild type and as in other epidemics the victims were principally children of school age. Seventy-nine cases with 6 deaths resulted from the San Juan outbreak, and altogether 330 cases were reported from the Northern Division of Trinidad. The primary cases were children and infection was traced to bathing, drinking and washing in the San Juan river. At the Laboratory 1,603 samples of blood serum were submitted to the *Widal* tests and 410 agglutinated *Bact. typhosum*. Three typical clinical cases failed to give positive *Widal* reactions—yet in two *Bact. typhosum* was isolated from the faeces and in a third fatal case post-mortem revealed typical typhoid ulcers.

Dysentery was responsible for 396 cases and 95 deaths. Differentiation of types of infection was carried out only for the 173 cases (35 deaths) treated as hospital in-patients. Of these 153 were *amoebic*, 13 *bacillary* and in the remaining 27 cases the type of infection was

Two new ward blocks capable of accommodating 96 patients approach completion at the Colonial Hospital, Port-of Spain and various minor works were carried out at the hospitals at San Fernando Tobago and Princes Town. Other work to be undertaken includes additions to the Nurses Home and construction of a general administrative casualty block at the Port-of Spain Hospital.

The facilities available for the isolation of cases of infectious diseases are inadequate and unsatisfactory and requirements can only be met by the provision of an Isolation Hospital with a trained nursing staff.

Two Ward Sisters and 14 Nurses were appointed during the year for service in the Colonial and District Hospitals.

A new syllabus of work was drafted for use in the three Nurses Training Schools in Port-of Spain, San Fernando and Tobago with a view to securing uniformity of training and examination standards. The following successes were recorded at the annual examination for nursing certificates —

	1st year	2nd year	3rd year
Colonial Hospital Training School Port-of Spain	16	7	7
San Fernando	8	7	12

In the following Table are summarized details as regards bed accommodation and the volume of work dealt with in the various hospitals in the Colony during 1937 —

Institution	Beds	Admitted	Treated	Died
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Mental Hospital	636	262	1 009	112
Leprosy Asylum	400	78	488	29
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Three Emergency Hospitals	14	?	223	?

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- PAWAN (J L.) A case of sickle cell anaemia in Trinidad.—*Ann Trop Med. & Parasit* Vol. 31 No. 2.
- Infectivity of the saliva in paralytic rabies.—*Ann Trop Med & Parasit* Vol. 31 No. 2.
- Functions of the oesophageal diverticula of *Stegomyia aegypti* and *Anopheles tarsimaculatus* *Ann Trop Med. & Parasit* Vol. 31 No. 2.
- GOSDEN (Dr Minnie) A suspected case of non-epidemic typhus in a child in Trinidad. *Trans Roy Soc Trop Med & Hyg* Vol. 21 No. 3.
- METIVIER (V) Lymphosarcoma of the eyelid.—*British Journal of Ophthalmology* 1937 Reproduced in *Edinburgh Med. Journal* and in the 1937 year book of Eye Ear Nose and Throat, Chicago.
- A study in syphilis. The causation of ophthalmic disorders in coloured races with special reference to the British West Indies. *British Journal of Venereal Diseases* 1937 October.

Financial—In accordance with usual practice the financial statement is presented with considerable detail. Total expenditure on Health Department services amounted to \$1 051,601 a sum which represents 9.8 per cent. of the total expenditure of the Colony during 1937.

SOUTH ATLANTIC

FALKLAND ISLANDS (1937)

The Falkland Islands are situated in the South Atlantic Ocean between 51° and 53°S latitude and 57° and 62°W longitude some 480 miles N.E. of Cape Horn and 1 000 miles due south of Monte Video. They consist of East Falkland (area 2,550 sq miles) and West Falkland (2,038 sq miles). There are two groups of dependencies: (1) South Georgia with South Orkney and South Sandwich and (2) South Shetland and Graham Land. South Georgia lies about 800 miles to the east of the Falkland Islands and South Orkney and South Sandwich some 450 miles to the south-east and south-west respectively of South Georgia. South Shetland is 500 miles south of the Falklands.

Vital Statistics—The estimated population of the Falkland Islands at the end of the year was 2 391. Registered births numbered 37 and deaths 20, the resulting birth and death rates being 15.5 and 8.4 respectively. For the Dependencies (see above) the corresponding data reads: population 700, births one, deaths nil.

It is interesting to note that in the Island of East Falkland where approximately 65 per cent. of the total population are to be found there were no infant deaths recorded. In West Falkland there were two such deaths.

Maternity and Child Welfare Work—At the King Edward VII Memorial Hospital Stanley special arrangements are made for dealing with ante-natal cases. The general physical examination made at first visits is followed by examinations at fortnightly and monthly intervals. During the year 25 women were on the registers of the Ante-natal Clinic and were seen in the aggregate 81 times. Of the 30 women delivered at the Hospital only 3 appear to have had no ante-natal supervision. At the *Infant Welfare Clinic* which is held at weekly intervals during the first year of life infants are seen first at intervals of two weeks and later every month. During the second year they are seen at two-monthly intervals. The aggregate attendance was 470 with an average attendance of nine.

School Hygiene—The pupils at the Government and St. Mary's Schools were examined. Pupils are examined in the presence of their parents and defects etc. discussed at the time. Dr G. KINYEARD refers to the adoption of the *Vau Pirquet Pelidisi* scale† used for the assessment of nutrition of pupils during 1936 (see this *Bulletin* 1938 Supp. p. 283*) which declared that 82 pupils then examined were under-nourished. Re-examination of these children showed that on a

† *Vau Pirquet Pelidisi scale*—the index formed by taking the cube root of ten times the weight of the subject in grammes divided by the sitting height in centimetres and multiplying by 100. *Vau Pirquet* found in Vienna that a healthy child had an index of 100.

This index was first called "*Gedulss*" from the first syllables of the words forming the sentence: *Gewicht zehnfach linear durchziehen der dritten Wurzel, dividiert durch Sitzhöhe*. Subsequently the word "*Pelidisi*" was preferred, derived from the Latin: *Pondus decies lineare divisio sedentis altitudo*.

See *Guiding Principles for Studies on the Nutrition of Populations* by E. J. Bigwood. Published by the League of Nations Health Organisation, Geneva, 1939. Footnote, p. 168.

clinical basis only 50 children were under nourished. Among other findings recorded it is stated that 36 per cent. of the children examined had dental caries 31 per cent. some abnormality of nose or throat and 8 per cent. some eye defect.

It is pointed out that Section 13 of the Education Ordinance requires the Government Medical Officer to examine school-children at least once a year though he is not specifically enjoined to pay any attention to the subject of school hygiene. In the opinion of Dr Kinneard the Education Ordinance requires amendment in order to provide the Senior Medical Officer or Board of Health with authority to insist that prescribed hygiene standards shall be maintained in all schools.

Public Health, Sanitation etc.—In February 1937 Dr G Kinneard succeeded Dr R. L. Cheverton as Senior Medical Officer of the Falkland Islands. During the year under review the Health of the Colony showed no unusual or disquieting features. The *Public Health Ordinance* No. 5 of 1894 was amended provision was made for the creation of a *Board of Health* for the whole Colony for regulations empowering any Inspector of Nuisances to enter premises used for the sale of butcher's meat and for the punishment of persons exposing for sale meat unfit for human consumption, and regulations for the proper control of markets and slaughter-houses.

Dr Kinneard describes the somewhat unusual system of sanitation and general hygiene in the Town of Stanley. The Senior Medical Officer is responsible for the health of the Colony as a whole and sits as President of the Board of Health. The Director of Public Works has a seat on the Board of Health though is independent of it as regards all questions of sanitary engineering, and is in control of the hygiene of public buildings, public baths schools *sewage* and *refuse* and *water supplies*. Of the 284 houses in Stanley 218 have connections to the main sewer and 168 have piped water supplies. A few houses still use rain water and the pail system of night soil disposal is in use in houses not connected to the main sewer. All new houses are required to be connected to main water and sewage systems. The Board of Health is empowered to condemn and demolish houses unfit for human habitation.

Medical service outside Stanley is provided on the public health side by Government. As regards medical care the Falkland Islands Company maintains a resident doctor at Darwin who attends to people in the Company's Camp and in two other stations. Patients requiring hospitalization are admitted to the King Edward VII Memorial Hospital. One Government Medical Officer is constantly maintained on the West Falkland and one in Stanley to assist the Senior Medical Officer and to attend non-Company stations. Medical Officers tour all camp stations twice a year.

As regards the *nutrition* of the population in the Falklands (see this *Bulletin* 1938 Supp. p. 283*) a Committee was appointed by His Excellency the Governor in 1936 and their *Memorandum on Nutrition* which was submitted in 1937 is presented as an Appendix to the Report under review. This *Memorandum* discusses the problem under the following headings, (I) Present knowledge of nutrition in the Colony (II) Practical measures taken in the past to apply scientific knowledge to the improvement of nutrition, (III) Measures studies and researches in connexion with nutrition which appear

desirable in this Colony and (IV) Consequences which improvement in nutrition would have on the economy of the Falklands.

Health Education during the year took the form of lecture demonstrations on food the writing of essays on health subjects by school children the holding of a Baby Show and individual teaching at the various Clinics.

Port Health Work—Relatively few ships from foreign ports enter the Colony of the 26 ships entering Port Stanley during the year 13 were from Monte Video and 8 from Chile. Arrangements have been made with H B M Consuls in various South American ports to wireless information in the event of any scheduled infectious disease occurring at such ports. Regular written reports are also received covering the incidence of communicable diseases in Monte Video the latter port is the principal point of contact—mails are carried to and from Monte Video by local vessels and mail communication with the United Kingdom thus ensured. During 1937 all vessels approaching the Colony were requested to send a radio message to the Senior Medical Officer if they had a clean Bill of Health etc. This method of arranging radio-pratique appears to have functioned successfully.

Hospitals Dispensaries etc—Admissions to the King Edward VII Memorial Hospital numbered 219 and 6 deaths were recorded. New cases amongst out patients numbered 1010 and subsequent visits for treatment 2084. In the District 296 first visits of out patients were recorded and 652 subsequent visits.

Difficulty was experienced in securing *nurse probationers* the regulations are being revised with a view to providing more attractive terms.

The Medical Officer West Falkland reports that during the year 302 cases were seen of these 183 were dealt with at Headquarters and the remainder at the various stations (there are 12 such centres) entailing an absence of 50 nights from Headquarters.

No Government Doctor is stationed in the Dependencies medical services being rendered by ships surgeons on whaling ships no details are supplied.

The Report of the Dental Surgeon is presented as an Appendix to the Report under review. Work was begun to determine (a) the average caries rates for various age-groups (b) the structure and quality of teeth, (c) the effect (if any) upon the teeth of a group of children of administering a pint of milk and fifteen drops of Radiostoleum daily for one year (d) any marked difference between the average Falkland Island diet and a balanced ideal diet and (e) any marked difference in the dental caries rate experienced by the foreigner in the Falklands and during residence elsewhere.

As regards *morbidity experience* it is noted that 1937 was completely free from most if not all the communicable diseases. No case of measles scarlet fever diphtheria whooping cough enteric fever or meningitis was seen.

Six cases of *tuberculosis* were recorded. The Agricultural Adviser carried out over 100 tuberculin tests on cattle but found no reactors. Other diseases of the *respiratory system* were responsible for 12 in-patient admissions, 101 cases treated as hospital out patients and 45 district out patients.

In July an epidemic of *influenza* swept the Colony there was no mortality from *influenza* proper but several cases of broncho-pneumonia associated with attacks of *influenza* terminated fatally. Hospital returns show that 6 in-patients were treated for the diseases there were 24 Hospital and 96 District out patients. In the West Falklands 72 cases were recorded and in the Dependencies 14.

Dr. Kinneard supplies a brief but interesting commentary on various epidemiological aspects of the outbreak. A crude attack rate of 67 per cent. was distributed as to 65 per cent. in the 5-15 age-group 72 per cent. in the 16-40 age-group and 64 per cent. at ages over 40.

During the warmer months simple cases of *diarrhoea* and *enteritis* were observed. At the King Edward VII Memorial Hospital 6 in patients were admitted for *enteritis* among hospital and district out patients 44 were treated for *diarrhoea* and 47 for *dyspepsia* (see this *Bulletin* 1938 Supp. p. 284*). The Medical Officer West Falkland, treated 79 patients for *diseases of the digestive system*.

Infectious adenitis or *glandular fever* is said to have been observed in several children. One case at the King Edward VII Memorial Hospital and one in West Falkland are recorded. *Impetigo* was frequently seen among out patients. A particularly virulent form developed almost epidemic proportions in West Falkland, and proved resistant to treatment.

Considering the size of the population, *diabetes* and *asthma* are said to be unusually prevalent. A considerable decrease in the numbers of cases of *appendicitis* is noted. 22 cases are shown in the classified returns 12 were treated as in patients, and only 11 appendicectomies were performed as compared with 40 in the preceding year (see this *Bulletin* 1938 Supp. p. 284*).

In the 1936 Report investigation of the *haemorrhagic diathesis* which appeared to characterize the members of certain family groups in the Falklands was suggested. Dr. Kinneard is of the opinion that in view of the many technical difficulties involved, the attempt to carry out such an enquiry might be postponed for the present. no cases of abnormal bleeding were encountered during the year.

The Report observes venereal disease is very seldom seen. Only two proved cases of *gonorrhoea* (both in seamen) and one suspected tertiary syphilitic were treated during the year.

Financial—Total expenditure on Medical and Sanitary services during 1937 amounted to £5 015 (the figure given in the 1936 Report, excluding the item Personal Emoluments) a sum which represents 7 per cent. of the total revenue of the Colony over the same period.

Territory	Estimated population	Births	Birth rate	Deaths	Death rate	Infant deaths	I.M.R.	Remarks
WEST AFRICA—								
Nigeria	For registration areas only. See text.							See text.
Gold Coast	Africans 3 700 335	11 234 ¹	33.7 ¹	8 431 ¹	25.3 ¹	—	—	¹ 35 registration areas only see text.
The Gambia	Non-Africans, 3 182	—	—	—	—	—	—	¹ Bathurst only
	Africans, 14 097	370 ¹	26.2 ¹	414 ¹	29.3 ¹	—	254.1 ¹	
Sierra Leone	Non Africans, 232	—	—	—	—	—	—	
	Colony 104 822	2 406	22.9	2 568	24.5	593	—	
	Freetown, 63 753	1 344	21.0	1 439	22.8	377	—	
	Protectorate 1 672 058 ¹	1 843 ¹	?	565 ¹	?	80	?	¹ Census figure 1931. See text.
EAST AFRICA—								
Kenya Colony	Europeans 19 211	313	—	119	—	—	—	¹ Registration incomplete see text.
	Africans 3 253 689	603 ¹	—	2 211 ¹	—	—	—	¹ For local distribution see text.
	Others 61 291	—	—	—	—	—	—	¹ No reliable data available
Uganda	3 628 549 ¹	92 069 ¹	25.4 ¹	68 735 ¹	18.9 ¹	14 302 ¹	155.7 ¹	¹ For data relating to limited areas see text.
Tanganyika	Natives 5 140 396	—	—	—	—	—	—	
	Non-Natives 42 147	—	—	—	—	—	—	
Nyasaland	Africans, 1 635 804	—	—	—	—	—	—	¹ See text.
	Europeans 1 894	28	—	18	—	—	—	¹ Some data from tribal authorities see text.
	Asians, 1 631	83	—	19	—	—	—	
Zanzibar	243 185	4 139	17.0	4 028	16.9	—	—	
Somaliland	Europeans, 68	—	—	—	—	—	—	
	Natives (Somalis)	—	—	—	—	—	—	
	344 700	—	—	—	—	—	—	
	Others, 2 615	—	—	—	—	—	—	

VITAL STATISTICAL SUMMARY FOR 1937—continued

Territory	Estimated population	Birth	Birth rate	Deaths	Death rate	Infant deaths	I M R	Remarks
ROUMANIA— Northern Rbdomania	Not supplied	—	—	—	—	—	—	See text.
NORTH AMERICA— Sudan	5,576,012 ¹	—	—	—	—	—	—	Incomplete, see text. Data for certain districts only.
SOUTH AMERICA— Danstoland	Paraguay, 1,434 Uruguay, and others 602,250	—	—	—	—	—	—	No data of births or deaths available.
DOCHMANLAND Swanland	See p 88 ¹ Rumania, 2,740 N. Africa, 154,475	—	—	—	—	—	—	No data of births or deaths available.
St Helena	4,515	132	29.2	52	7.1	6	48.4	
MEDITERRANEAN— Palestine	1,716,767	54,749	41.0	24,881	18.9	8,508	162.8	Excluding Bedouin tribes.
Trans-Jordan	300,000 ¹	11,498	38.3	6,342	21.1	?	203.0	A rough estimate.
Cyprus	570,913	—	29.5	—	17.0 ¹	—	159.3	For distribution, see text.
Gibraltar	19,541	361	19.1	292	14.9	26	68.2	16,792 were British subjects.
Maltese Islands	284,687 ¹	8,879	31.5	8,304	29.0	2,155	242.7	Malta 238,870. Gozo 25,000.
INDIAN OCEAN— Ceylon	5,712,000 ¹	219,078	37.8	124,310	21.7	34,180	158	For racial distribution, see text.
Mauritius	399,887	14,097	35.2	11,527	28.8	2,178	154.5	For District distribution, see text.
Seychelles	30,910	827	26.7	440	14.2	67	81	
PACIFIC— Federated States	1,981,267	74,198 ¹	37.8	29,031	19.9	—	147	For details for each State see text.

VITAL STATISTICAL SUMMARY FOR 1937—continued.

Territory	Estimated population	Births	Birth rate	Deaths	Death rate	Infant deaths	I.M.R.	Remarks
PACIFIC—cont.								
Straits Settlements	1 245 739 ¹	52 483 ¹	42.1	27 974 ¹	22.5	—	155.8	¹ For details see text.
Singapore Municipality	529 184 ¹	22 621	43.5	11 686	22.5	3 888	171.9	¹ For racial distribution, see text.
Penang Municipality	168 067 ¹	5 909	35.2	3 208	19.0	783	129	¹ For racial distribution, see text.
Unfederated Malay States—								
Jobore	613 510 ¹	27 031	44.1	12 882	21.1	4 151	153.0	¹ For racial distribution, see text.
Kedah	474 775 ¹	17 684	37.2	9 781	20.6	2 438	135	¹ For racial distribution, see text.
Perlis	52 703 ¹	1 793	34.0	965	18.3	189	105.4	¹ For racial distribution, see text.
Kelantan	400 378 ¹	10 811	27.9	6 895	17.4	1 221	112.4	¹ For racial distribution, see text.
Trengganu	188 246	6 845	34.5	4 427 ¹	22.3	1 202	175.6	¹ See text.
Other Far Eastern Possessions—								
Brunei (British Malaya)	35 963 ¹	1 472	41.0	772	21.5	322	219	¹ See text.
Hong Kong	1 006 882 ¹	32 303	32.1	31 635	31.4	11 653	369.2 ¹	¹ 184 400 Chinese ¹ 378.0 see text.
British North Borneo	299 311	8 022	26.8	7 558	25.2	1 286	103.3	
PACIFIC OCEAN—								
Philippines—								
Philippines and Western Pacific	205 397 ¹	7 281	35.5	3 225	15.7	543	74.8	¹ For distribution, see text.
British Solomon Islands	94 700 ¹	—	—	—	—	—	—	¹ See Comments in text.
Albert and Ellice Islands	38 439 ¹	1 286	37.3	711	21.0	161	127.1	¹ For distribution, see text.

VITAL STATISTICAL SUMMARY FOR 1937—continued

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Territory	Estimated population	Births	Birth rate	Deaths	Death rate	Infant deaths	I M R	Remarks
REUNION— Northern Rhodesia	Not supplied	—	—	—	—	—	—	See text
NORTH AFRICA— Sudan	5,578,012 ¹	—	—	—	—	—	—	Incomplete, see text. Data for certain districts only
SOUTH AFRICA— Basutoland	Europeans, 1,434 Bantu and others 662,250	—	—	—	—	—	—	No data of births or deaths available.
DECEANALAND Swaziland	See p. 63 Europeans, 2,740 Natives, 164,475	—	—	—	—	—	—	No data of births or deaths available.
St Helena	4,515	132	29.2	52	7.1	6	45.4	
MEDITERRANEAN— Palestine	1,516,787	54,749	41.6	23,864	18.9	8,306	152.8	¹ Excluding Bedouin tribes
Trans-Jordan	300,000 ⁴	11,486	37.3	6,342	21.1	?	203.0	A rough estimate
Cyprus	370,935	—	29.5	—	17.0	—	169.3 ¹	For distribution, see text.
Gibraltar	19,541	381	19.5	282	14.9	76	68.2	16,792 were British Subjects.
Maltese Islands	264,603	8,678	33.5	8,301	30.0	2,135	42.7	Malta 238,970 Gozo 25,633.
INDIAN OCEAN— Ceylon	5,712,000	216,079	37.8	124,210	21.7	24,180	159	For racial distribution, see text.
Mauritius	369,867	14,067	35.2	11,637	28.6	1,178	154.5	¹ For District distribution, see text.
Seychelles	30,940	827	26.7	440	14.2	67	81	
FAR EAST— Federated Malay States	1,961,307 ¹	74,106 ¹	37.8	39,031	19.9	—	147	¹ For details for each State see text.

VITAL STATISTICAL SUMMARY FOR 1937—continued

Territory	Estimated population	Births	Birth rate	Deaths	Death rate	Infant deaths	I M R.	Remarks
WEST ATLANTIC—								
Bahamas	60,006	2,189	36.6	1,019	17.0	443	310.5	
Barbados	190,920	6,670	35.7	3,511	18.4	1,228	317	
Bermuda	30,851	716	23.1	329	10.6	52	72.6	
British Guiana	237,009	11,237	31.3	7,367	21.9	1,359	121	
British Honduras	66,865	1,676	32.9	1,054	16.6	230	133.6	For local distribution, see text.
Jamaica	1,152,528	25,352	31.1	17,461	16.3	—	119	
Cayman Islands	See p 257*	—	—	—	—	—	—	1921 Census figures.
Turks and Caicos Islands	5,613	166	29.4	90	16.0	—	127	
Lowland Islands—								
Antigua	34,523	1,157	34.5	609	20.6	191	171.1	
St. Christopher and Nevis	28,057	1,411	37.1	836	23.3	228	161.6	
Dominica	49,483	1,487	30.3	711	14.6	170	114.3	
Montserrat	13,712	449	33.7	210	15.3	71	156.1	
Virgin Islands	6,240	207	33.2	68	10.9	27	130.4	
Windward Islands—								
Grenada	66,201	2,764	31.5	1,265	14.3	—	115	
St. Lucia	67,404	2,216	33.9	936	14.4	224	101.1	
St. Vincent	67,826	2,317	40.3	678	16.3	273	117.6	
Trinidad and Tobago	456,043	14,226	31.5	7,848	17.4	—	120.6	
SOUTH ATLANTIC—								
Falkland Islands	2,391	37	15.6	20	8.4	—	—	

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